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BAKING TECHNOLOGY

*A Journal of
Applied Science
in Baking*



*Published by
The American Bakers
Association*

Vol. II CHICAGO, ILLINOIS, JANUARY 15th, 1923 No. 1

Wanted, Helpful Cooperators

DO YOU, Mr. Baker, want an 18 per cent raise in your bread shipping rates? If not, then there is work for you to do in 1923, and it is earnest, hard work, too. And this is only one of the fields in which you must go to work. In fact, there never was a year in which the members of the World of Bakerydom had so much to win by working together, or so much to lose by continuing apart in rival groups.

If the bakers cannot forget rivalry and animosities and combine on all those things wherein victory is to be won only by united action, then our bakers may rest assured that others who have much

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to win by uniting, will do it and will eat larger holes than in the past, into the prestige of the baking world.

For instance a Battle Creek concern has gone in for a pre-digested form of bran wafers. We encountered suddenly an old man on tour through America's public schools. He was giving "health talks." He told the children they must eat whole wheat products or they would never

grow old like himself, with good health. He promised the children he was going to live on bran foods to be 150 years old. He did not tell the children that their dinners of eggs and salads and milk, and

white bread were as complete in assorted food needs, as any foods in the world.

"And if you people in the baking world remain enslaved to the flour trust," the Mr. Methusaleh averred, "we don't care at all. We will pull the people away from you and get them onto the Battle Creek products."

That was a nice kind of propaganda to have running wild in the Nation's public schools. We found behind this man an organized propaganda.

At the convention of the baking industry in Lansing, the old man was invited to make his case. He came and said all that was in his heart to say, and then a supplies salesman stood up at a banquet to give what was to him the lesson of the hour for bakers.

To make his case he told a story. It was the story of the crack stage driver who popped his whip—and killed a horsefly on his lead horse's ear. As the stage driver continued to display his skill he flicked horseflies, one after another, from his horses without ever disturbing the animals or hurting them with his far flung lash. At last the stage lumbered along beneath a tree on a far reaching limb of which stood a hornet's nest.

"Flick off those hornets," suggested one of the passengers who stood in awe of the driver's great skill.

"Not much I won't," the stage driver answered, "them hornets **is organized.**"

The story is a long-lived one but it will never grow old so long as there is one baker left out of the fold of those who are upbuilding their National Organization.

Express Rate Fight

Here for instance is the coming Express Rate fight. We won last year a special fight on cake shipment rates.

That was only a skirmish. This fight

is scheduled to be a pitched battle in which every shipper under the second class rate will be involved. The cake-rate fight was won because it could be called "special raising" of one product.

In this pitched battle that is coming along the American Bakers Association has the advantage of representing one of the most essential food products in the land. We have only, in a united way, to let the people know what is coming along.

The people will not want to see the rates raised when they know this means higher priced bread in sparsely settled districts. The American Bakers Association has the advantage, too, of having instituted a counter suit. This counter suit, docketed as number 14080, seeks to compel a reduction in the express rates on shipments of bread and cake.

An 18 Per Cent Raise

This case has been set for a hearing in January, but soon after it is to be heard, will come along the hearings on the American Railway Express Company's application for an 18 per cent increase on all second-class rates.

Eugene H. Hickok, special counsel of American Bakers Association in this case, has prepared the data necessary for the fighting of both issues. Back of him is the American Association's special Express Rate Committee. This committee is now reinforced by new members in the American Bakers Association, among cake manufacturers.

The fight has already brought into our organized forces the Nation's leading cake bakers. It may bring in other allies before it is won.

Mr. Hickok's View

In a letter to 100 or more shipping bakers, from whom data is necessary to complete the bakers' case before the Inter-

state Commerce Commission, Special Counsel Hickok set forth certain facts from which the following is taken:

"In former cases we have shown that there is but a small margin of profit to the baker on bread and cake shipments, stating that the bread and cake business is characterized by narrow margins and depending to considerable extent on rapid turnover and volume. We have also shown that profits on most of our shipments are wiped out by the increase of 26 per cent in express rates in 1920, thus restricting our profitable shipping area.

The Pick-up Service

"It has been shown to the Commission that the pick-up service is done to a large extent by the baker himself at shipping points and that there is not a great deal of delivery service at destination because bakery shipments usually go to small towns where there is no delivery service.

"In its recent holding in the cake classification case, the Association won a 100 per cent victory decision. (I & S Docket No. 1601). The Interstate Commerce Commission took occasion to hold specifically on these points and decided that the shipment of bread and cake, on account of these advantages to the express companies, could not be compared to other express business."

Questions to the Trade

Mr. Hickok asked all bakers interested to send him speedily, answers in triplicate, each copy signed, to the following questions:

1. What is the maximum distance you ship bread or cake?
2. What is the approximate average distance of all your shipments?
3. What is the average weight usually shipped?
4. What is the maximum weight usually shipped?

5. What proportion of your shipments do you find it necessary to deliver to the express company's terminal? Why?

6. Are most of your shipments called for by your customers at destination?

7. Attach statement giving list of shipments made on typical day using following headings:

Where From. Where To. Weight. Charges. Bread and Cake or Mixed Bread and Cake.

8. Give total amount paid in express charges in 1921.

9. What percentage of your total business is your shipping business?

10. Do you use shipping cartons or shipping baskets?

11. Does your local express agent try to get more business from you or help you in any unusual way to keep your business?

We print these eleven questions to give all bakers who may see these words a picture of their industry as the Interstate Commerce Commission sees it.

There are scores of angles from which our industry is looked at peculiarly. The farmer's is one. The grocer's is another. The chain store man's is another. Are you a wiser baker for knowing the case of each group around and about us?

If so, aren't you interested in seeing that the Industry builds up in Baking Technology a genuine broadcasting station through which all learn the essential facts about industrial growth?

Aren't you interested in membership now that the dues are down to half what they were and half what they must be unless we make up in numbers what we have lost in inflow from the devoted few who have heretofore carried the load of organization and progress?

Changing Views of Nutrition

An Authoritative View of the Role that Chemistry Is Now Known to Play as a Factor in Nutritional Process

AS one of the first men in America who began animal feeding experiments as a test for food qualities, Lafayette B. Mendel, of Yale University, now ranks as one of the principal authorities in this field. Since an appeal has been made by many authorities that we revise our eating habits to conform to what is called "The Newer Knowledge of Nutrition," the views of Dr. Mendel become timely to the baker. They throw light just at this time on the problem attacked in the attempt to restore to white bread the mineral salts and soluble proteins removed with the wheat bran.

Dr. Mendel gave his views on "Chemical Factors in Nutrition" before the Section in Physics and Chemistry, Franklin Institute, in March, 1921. What follows is a condensation from the paper he then presented:

When the food which we ingest starts on its way along the path of the alimentary tract it is ordinarily regarded as having entered the body. It does, in truth, disappear from sight as soon as it has passed beyond the mouth and into the deeper recesses of the organism; but every one who is familiar with the structure of the long gastro-intestinal tube—the digestive canal—realizes that the walls of the latter offer a pronounced barrier to the ready transport of the swallowed food materials to the various tissues and organs where it may be needed. To follow the nutrients into the stomach and upper intestine is comparatively easy; far more difficult, however, is the task of tracing their passage through the thick walls of the alimentary tract into the lymph and

blood-streams where they are distributed far and wide in the body.

Insoluble food particles obviously cannot permeate the mucous membrane that lines the enteric tract. The older physiologists, who concerned themselves not at all with the problem of how such solid nutriment is made available, were content to assume that in some way it must become soluble so that it can filter or diffuse through the gastro-intestinal wall. Some sort of digestion was thus conceived to be essential to absorption in the case of insoluble products such as much of an ordinary meal represents. For a long time it was vigorously debated whether digestion in the stomach, and perhaps beyond, was not secured by mechanical trituration of the food or by some fermentative processes. It redounds to the credit of the progress of science in America that this country early furnished one of the great classics in the study of physiology of digestion. The pioneer investigations of Dr. William Beaumont on Alexis St. Martin, the man with "the lid on his stomach," helped to elucidate the nature of the gastric juice and establish the fact that it is an "agent of chymification" which "acts as a solvent of food and alters its properties." Experiment thus replaced conjecture.

The familiar foodstuffs—the proteins, fats and carbohydrates—which in large measure compose our food, are not simple chemical substances; they are for the most part rather complex compounds. With the development of the physiological chemistry of digestion has come the growing recognition that all the foodstuffs not

merely are dissolved, but are further chemically disintegrated before they experience absorption. This profound cleavage of the nutrients into relatively simple fragments is accomplished by the unique potency of the digestive juices. In my own student days it sufficed to believe that the digestion of proteins, accomplished by the proteolytic enzymes or ferments of the gastric and pancreatic secretions, transformed the albuminous substances into proteoses and peptones, still essentially protein in nature except for a greater diffusibility, and perhaps to a smaller extent into a few then recognized amino-acids. Foster's "Text-book of Physiology," a popular treatise of a quarter of a century ago, stated:

"In all events the greater part of the proteid material of the food enters the blood as proteid material either as peptone or in some other form, and is carried as proteid material to the tissues, * * * The evidence as far as it goes tends to show that the metabolism of proteid is very complex and varied, that a large number of nitrogen-holding substances make a momentary appearance in the body, taking origin at this or that step in the downward steps of katabolic metabolism and changing into something else at the next step, and that the presence in various parts of the body and even in the urine, in small quantities, of so many varied nitrogenous crystalline substances, forming a large part of what are known as extractives, has to do with this varied metabolism. Possibly the transformations by which nitrogen thus passes downward take place to a certain extent in such organs as the liver and the spleen, which are remarkably rich in these extractives. But the whole story of proteid metabolism consists at present mostly of guesses and of gaps"

To-day there is added the knowledge of

the further peculiar proteolytic power of the intestinal secretion, with the possibility of a more or less complete disintegration of proteins into their constituent amino-acids prior to absorption. So, too, the fats are digested, not merely dissolved or absorbed in particulate form; and the carbohydrates pass through the alimentary wall as simple monosaccharide compounds. The true nutrient units discoverable after absorption in the blood-stream are comparatively simple chemical compounds rather than the complex food substances which we ordinarily ingest. Hence there is a significant truth in the recent statement that "the tissue cells never know the food which we eat." Digestion, profound in its chemical cleavages, is recognized as the indispensable forerunner of absorption.

The outcome of the digestive disintegration of the ingested foodstuffs is, therefore, somewhat different from what one would have assumed only a few years ago. The ultimate sources of energy for the organism start as relatively simple chemical compounds on the path of distribution to the places where they are required for fuel or constructive enterprises. Amino-acids, other nitrogenous units like purins or nucleosides, simple sugars, and fats represent the particular types of matter that enter the transportation routes of the circulation. Sometimes they are built selectively into desired structures—into tissue fabrics or components of secretion; sometimes they are stored in special depots as fat or glycogen or protein to await a future demand for these reserves; sometimes they are at once consumed or, to quote the term used by the physiologist, they are metabolized.

The analogies of the steam engine with its fire box and fuel and air supply leave us in the lurch when we attempt to institute a strict comparison with the liv-

ing organism. Indeed it may as well be admitted that the complete history of the physiological metabolism of matter is still obscure and unrevealed. From time to time, however, new details have come to light, revealing some of the secrets of the chemical processes upon which life depends. Let us turn our attention to a few of these.

How Yeast Grows

There are organisms which can satisfy their biological needs with a comparatively few substances of relatively simple character. Thus the yeast plant can be made to grow and complete its life cycle in a medium that furnishes only comparatively simple compounds—a little pure sugar, nitrogen in the form of ammonium sulphate, along with phosphates and chlorides of potassium calcium, and magnesium. Development under these circumstances means profound chemical synthesis. The yeast organism builds up highly complex proteins, fats, carbohydrates, nucleic acid and presumably a multitude of as yet unrecognized compounds into the tiny cells that seem so simple and relatively undifferentiated to an observer through the microscope. Plants in general possess such remarkable powers of synthesis—mysterious and never failing in their wonders. The carbon dioxide of the air suffices to furnish carbon for most elaborate structures.

Such well-recognized atmospheric sources of plant nutriment were scarcely dreamed of by the older investigators who searched for a "principle" of vegetation to account for the phenomena of soil fertility and plant growth.

The animal organisms, on the other hand, are not endowed with capacities for constructive work equal to those possessed by plants. It is not merely nitrogen, carbon and oxygen in some simple group-

ings that they require to be elaborated by them synthetically into brain and muscle and gland components. The powers of synthesis in animals are limited. Bathed though they continually are in a sea of nitrogen, they cannot utilize it to produce nitrogenous tissues. There are certain structural units which the animal cannot manufacture *de novo*. Unless these are supplied as such, growth, tissue construction and repair are limited to the available supply of the essential parts.

New Light on Proteins

The evidence for this conclusion forms a comparatively recent chapter in the study of nutrition. The nitrogenous needs of an animal can be supplied by the inclusion of protein in the diet. The newer chemistry of the proteins has brought unexpected revelations regarding their intimate structure and has thereby completely altered the traditional views regarding their physiological behavior. It has been demonstrated that, in general, the proteins are complexes which yield eighteen or more amino-acids that have become prominent items of interest to the student of nutrition. The proteins from different sources, and likewise the different proteins from a single plant or animal tissue, may vary in respect to the proportions of the characteristic amino-acids—the constructive units or "building stones" out of which they are built up. Some fail to yield one or more of the amino-acids usually obtainable from proteins. In this sense they are sometimes spoken of as "incomplete" proteins. For example, of the usually obtained representatives, the protein zein of the maize kernel fails to yield either glycocoll, lysine, or tryptophane; the gliadin of wheat is comparatively poor in its contribution of lysine and extremely rich in the glutaminic acid group; the gelatin de-

rived from connective tissue lacks the tyrosine, tryptophane and sulphur-containing cystine groups.

Animal Feeding Experiments

The views just amplified have been substantiated by the more recent investigations in nutrition, particularly in the feeding of laboratory animals such as rats and mice. Thus, with an otherwise adequate diet the nitrogenous factors can be suitably supplied by proteins isolated from a considerable diversity of both animal and plant sources. The list includes such representatives as casein (milk), lactalbumin (milk), ovalbumin (hen's egg), ovovitellin (hen's egg), edestin (hemp-seed), globulin (squash-seed), excelsin (Brazil-nut), glutelin (maize), globulin (cotton-seed), glutenin (wheat), glycinin (soy-bean), cannabin (hemp-seed), as well as the total proteins present in various animal and plant tissues such as meat (muscle tissue), liver, kidney, brain, peanut, soy-bean, cotton-seed, etc. In contrast with the growth of white rats, for example, to adult size on mixtures of isolated food substances containing any one of the above as the chief source of protein in the diet is the failure to grow on foods containing other proteins which have a recognized deficiency in their amino-acid make-up, i. e., "incomplete" proteins.

It is instructive to follow the reaction of the public and the professions dealing with nutrition to each progressive step in the understanding of the nutritive functions. When the extent to which digestion occurs in the alimentary tract began to be disclosed by adequate experiments the predigestion of foods was promptly advocated, particularly for the sick and the young supposedly equipped with only feeble digestive apparatus. Meat and wheat and milk were prepared

in a diversity of predigested forms by the physician, by the layman acting on his advice, and by the manufacturer.

Foolishness of the Past

To-day few remember the multiplicity of unpalatable products that were advertised and advocated a generation ago. In those days one might have spoken of foods "predigested to absorb" as nowadays one is reminded of foods "cooked ready to serve." No one seems to have asked whether the human alimentary tract was often so enfeebled as to require digestive help, or whether the exercise of the digestive function were not beneficial rather than baneful. Disuse of some organs leads to atrophy. An unexercised muscle becomes flabby. With the waning prominence of predigested foods, "isolated" foods, and notably protein food products waxed in popularity. The protein of pot cheese was sold at liberal profits, as a dietary supplement, mostly to the highly educated classes who are sometimes also highly credulous. At present we are threatened with an avalanche of vitamin preparations. Somehow the drug store always manages to compete with the butcher shop and grocery, even in the domain of dietetics.

Danger of New Diets

When peoples are forced to depart from the traditional practices that experience has shown to be safe, danger may arise. This is what happened in such unfortunate ways during the war. It is what may happen anywhere whenever persons depart from established and well tested customs to enter novel paths. Thus the substitution of polished rice for the unmilled variety led to nutritive disaster, often told in the story of beriberi. Pellagra has a related history. Rickets has a background of defective diet. Scurvy, too, at-

tends the neglect of conventional modes of feeding. There is, then, room for a science of nutrition even in the domain of practical dietetics.

Man's Many Foods

In every-day life neither man nor animals ordinarily eat a single type of protein or even proteins from a single source. The intake consists, rather, of a mixture of proteins rarely, if ever, including only such as are entirely deficient in their amino-acid make-up from the physiological standpoint just defined. Nevertheless there may be a *relative* deficiency of some essential nutrient unit or "building stone" in comparison with the amount of other essentials. Building progress—tissue construction—may then be retarded by the lack of proportionate quantities of all the needed parts that cannot be synthesized directly by the body.

Even when the dietary food proteins are selected with a view to furnishing an adequate supply of all amino-acids known to be requisite, the nutritive processes of the body may exhibit defects not of supply but of utilization. A fire box may be equipped with a certain type of grate to burn coal of various sizes. If the grate is changed smaller sizes of fuel like pea coal may escape combustion by falling into the ashpit. So it happens that under as yet obscure conditions certain amino-acids fail to be completely consumed or utilized in the metabolism. Consequently they are eliminated more or less unchanged with the waste products. Cystinuria and alkaptonuria represent illustrative instances.

Cause of Acidosis

There are other cases in which a presumably adequate intake fails to unfold its entire nutritive possibilities because some defect in the organism inter-

feres with complete conversion of some ingredient. There are times when fats may fail of digestion and absorption. They then make their way through the entire length of the digestive tract, finding a way out with the stools. The disturbance or difficulty is one of digestion or alimentation. However, the fats may be digested, absorbed, and transported only to meet with inadequate chemical destruction in the usual reactions that liberate energy. Products of incomplete combustion arise, just as they do in the coal fire or gas engine. There may arise acetone, diacetic acid or betaoxybutyric acid, substances that are physiologically offensive and objectionable, that may induce an "acidosis," and that are speedily eliminated as well as possible.

Again, who is not familiar with the common condition known as diabetes in which sugar is not properly metabolized or stored in the body? There are in this country alone more than half a million diabetics, persons who fail to burn up one of the most common of food fuels. Striking statistics gathered by Doctor Joslin, of Boston, a conscientious student of diabetes, show an undeniable association of obesity and diabetes. It appears that persons above the age of fifty rarely acquire the disease, i.e., the inability to burn certain kinds of food fuel well, if their weight is not above normal.

When Nutrition Succeeds

Successful nutrition therefore not only demands the nutrient units properly digested and absorbed but also entails an organism in functioning condition to dispose of them. A water-power plant may become impaired not only when the supply reservoir runs low but also when its turbines or energy-converters are defective. But proteins and fats and sugars and their immediate chemical relatives

are not the only indispensable factors in a successful diet. Present day physiology—again largely a product of the work of American investigators—has demonstrated the dominant importance of certain inorganic factors—of calcium, phosphorus, chlorin, etc., and has given striking evidence of the role played by the so-called vitamins. The spark plug and lubricants help to make effective the energy stored in the gasoline supply of a heat engine. In nutrition likewise there are “accessories” without which the animal mechanism fails to run smoothly. The story of their importance may already be found portrayed with almost dramatic effect in the popular literature of the day.

A Valued Reconsideration

YOU will remember that we canceled our membership in your organization about a year ago, and of course the Gartner Baking Company, also the Jackson Baking Company, was included in this cancellation as plants of the Tristate Baking Company.

We have been so pleased with the work you and the organization have been doing for the good of the bakers, that we wired the president of the State Association at Lansing stating we would be pleased to again join the National Organization and to advise you accordingly. If this is agreeable to the Association members and yourself, we will be glad to forward you our application, membership to become effective January 1st, 1923. If agreeable to you, please send application blanks, and oblige

Tristate Baking Company,
John M. Gressell, General Manager.

I found Baking Technology on my desk and in reading over find so much good in it that I am enclosing a check for five dollars to help the cause along.

—W. W. Work, New Idea Bakery, De Ridder, La.

Our Alumni

THE American Institute of Baking, although it is only a year old in its own home, has already in the field a full-fledged Alumni association. The alumni are graduates of the School of Baking. They met at the Institute December 11, adopted a constitution, a school yell, a school pin, and a program that calls for annual reunions at the time of each National convention.

Officers elected for the first year were Harry Vorheis, president; Joseph Weil, vice-president; Herman Hecht, treasurer; and Herman Albers, secretary.

A banquet, marking the departure for the World of Bakerydom of the first twenty graduates, was attended by friends of the American Institute as well as former students. Speakers included Julian Livingston, chairman of the Institute Committee, H. E. Barnard, director of the Institute, “Art” Bamford, of Bakers Weekly, E. T. Clissold, of Bakers Helper, Mr. Werner, of the Northwestern Miller, and members of the School faculty.

The alumni voted to make Baking Technology official organ of the association so that they will always be kept in touch with American Association affairs and with their own fellow graduates. Thus the youngest of Industrial Schools launches itself upon the industrial world. The alumni heard of “paper plans” for an Institute like this in England and another in Canada and voted three rousing cheers for the leaders of the American baking industry who made both Institute and School real, while others planned, hoped and dreamed for some distant future.

I have read Baking Technology with much interest, and wish to congratulate the Association upon its Journal. I could not help but be impressed by the amount of work such a publication must take.

—Janet R. Ullrich, W. P. Tanner-Gross & Co.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

Published by the
AMERICAN INSTITUTE OF BAKING
1135 Fullerton Ave., Chicago

Entered in the post-office at Chicago, Illinois, as second-class matter, under the act of August 24, 1912.

Price, Fifty Cents a Number; Five Dollars a Year.

JANUARY 15, 1923

Halved—Will It Double?

Our National Convention halved the dues for 1923. Will halving the dues double the membership, and thus stimulate the spirit of share-and-share-alike in both burdens and benefits?

To Progressive Bakers

AS THE sun comes southward, warming the new year into life, we are wondering where within the baking industry are new impulses and new forces that can also be warmed into life and put to work for the Industry's advances.

If any baker has withheld his heart from the American Bakers Association "because it was run by a clique," let him consider whether his own resentment didn't help to leave all the work for a "clique" to do.

The year that has just closed has seen perhaps a greater advance under more difficult circumstances, than any year since the World War. Stronger state associations than ever in New England, New York, Pennsylvania, Nebraska, the Southeast, and California, are developing the leadership of Tomorrow for our great Industry. The National Association is rapidly shifting its plans to harvest this leadership into its service.

Earnest and hard working committees—not one man committees—are working with every charted problem the National association has to face. The greatest one is Indifference. If Mr. Lagback would consult with Mr. I. M. Sufficient, and both would come into our merry throng of co-operating bakers, our tasks would be immensely lighter.

We hope every baker has in 1923 a prosperous and satisfying year, based on honest service through a Quality loaf, made by healthy workmen in sanitary surroundings. We wish such prosperity also for the flour men, the machinery men, the pie bakers, the macaroni bakers, the cake makers, the allied tradesmen. For more and more we see that cooperation from all these must make up the sum-total of the developing Bakedstuffs Industry, whose power is yet that of an infant in its swaddling clothes.

More Stales—Less Sales

TWO bakers who violently disagreed on the advisability of state laws preventing the return of stale bread, found themselves in complete agreement upon one other matter. This was the uniting of all bakers to reduce this evil to its smallest possible proportions.

"The laws will work against wholesalers," insisted one, "for the retail baker who sells over his own counter doesn't have to take back his stales. He merely has them left on his hands."

"But a big percentage of returned stales," insisted the second, "mean a degenerating business. I never saw big sales and big lots of stales at the same time. If the public are getting partially stale bread they are getting a dislike for bakers bread with their loaves. I cut my stales down below one per cent. I rather sell close. At least I know my business is upward bound."

That was a sound view. The pity of the situation is that in nearly every city there is some one baker who tries to "saturate" the market by crowding all orders above normal consumption. The result is the others follow in a kind of war for output, and sales run up to four, five and six per cent.

The Outer Circle

IF ANY change in the baking industry is more vital than the rest it perhaps is the change in delivery opportunities brought about by good road campaigns, and the development of electric and gas trucks.

"Why should we build in Archangel?" chorused four or five bakers who were considering a new manufacturing center where Henry Ford alone was planning to employ 100,000 men. "It is only an hour and a half away by truck from our present plants." And each baker ordered three or four new trucks instead of calling for branch-plant architects.

Trucking costs amount to 20 per cent of a modern bakery's overhead budget. The public, especially the public living on farms, is discontented over the fact that the farmer gets as little as he does out of the ultimate cost to the consumer of a loaf of bread. It will be well to show the farmer that distribution is on as efficient a basis as possible. And how can that be done without constant analysis of delivery costs? We are glad to be able to promise full reports, now being worked out at the Food Research Institute at Stanford University, on this important theme.

Mr. Wilke's Efforts

AMONG the youngest and most aggressive bakers breaking through to a position of National leadership, in spirit at least, is Carl D. Wilke of Beatrice,

Nebraska. A year ago he was as studded with questions about all things affecting the baking industry, as a plucked goose is studded with pin feathers. He wanted to know about every industrial breeze blowing about in American affairs.

Suddenly he emerged as President of the Nebraska State Bakers Association. He gave the Association members more to think about in a week than perhaps they had troubled their minds over in many a previous year. He brings a serious charge against "big bakers." It is that often they neglect their State and neighborhood associations, and focus their hearts and eyes upon the National alone, if upon any association.

We hope Bro. Wilke speaks for the past and not for the future.

Getting Together

IT SEEMS to me bread made up with skim milk," writes W. C. Welburn, editor of the Kansas City Weekly Journal, "might fulfill the condition of cheapness and high nourishing value admirably. Nothing was ever invented that will feed a hog better than corn meal and skim milk. We are just hogs walking on two legs when it comes to our need for nourishment. Flour and corn meal are very much alike in nutritive value. I realize the labor difficulties of the bakers. Organized labor is the big and conscienceless profiteer of our time."

Mr. Editor Welburn is not alone in his concern about the farm's skim milk problem. The U. S. Department of Agriculture has appealed to the bakers to use more skim milk, and especially whey, to prevent a valuable food product from going utterly to waste. It is said that vast volumes of whey are lost now. Here, perhaps, is an opportunity for cooperation between baker and farmer that will rebound greatly to the benefit of both.

Figure Your Delivery Costs

They Are Such an Important Item that the Public Expects Efficiency In Delivery from the Baker

A FARMER who writes in bitterly that the farmers do not get a square deal out of wheat sales for bakers bread, claims that delivery costs are on an expensive and unscientific basis. We have replied that the industry is rapidly changing in this particular. Scientific accuracy is replacing guess work.

We have found that in hilly cities bakers prefer gas trucks to electric trucks. For "long hauls" they prefer big trucks

to "flivver" trucks. Often they are able to rent delivery equipment, including horses, cheaper than they could buy trucks. Sometimes they reject electric trucks because their business is not large enough to pay to install battery charging equipment.

Can bakery practise in these matters be standardized? Stanford University is studying to find out. In the meantime, estimate your own. Use this as a model:

FIRST—FIGURE YOUR INVESTMENT IN DELIVERY EQUIPMENT, ETC.

HORSE AND WAGON	GAS TRUCK	ELECTRIC TRUCK
1. COST OF:	1. COST OF:	1. COST OF:
.....Horses at . . . . .	.....Gas Truck	.....Electric
.....Wagons at	Chasses at	Truck Chas-
.....Sets of Har-	.....Gas Truck	ses at
ness at	Bodies at . . . . .	.....Electric
		Truck Bodies
		at
2. COST OF LAND	2. COST OF LAND	2. COST OF LAND
FOR STABLES	FOR GARAGE	FOR GARAGE
3. COST OF STABLE	3. COST OF GARAGE	3. COST OF GARAGE*
		(Some store elec-
4. COST OF EQUIP-	4. COST OF EQUIP-	trics at loading
MENT:	MENT:	platform.)
Stable Altera-	Garage altera-	4. COST OF EQUIP-
tions	tions	MENT:
Tools	Tools	Garage altera-
Parts	Parts	tions
Cleaning Equip-	Cleaning Equip-	Charging Appa-
ment	ment	ratus
TOTAL INVESTMENT	TOTAL INVESTMENT	Tools
		Parts
		Cleaning Equip-
		ment
		TOTAL INVESTMENT

NEXT—FIGURE YOUR YEARLY COST OF OPERATION

HORSE AND WAGON	GAS TRUCK	ELECTRIC TRUCK
1. FEED OR RENTAL	1. FUEL OR RENTAL	1. ENERGY (per
(per year):	(per year):	year):
Hay	Gasoline	Current
Oats	Oil	Distilled water
Corn	Or truck rental	Solutions
Bran	charge	TOTAL
Salt	TOTAL	
Water		
Or Horse Rental		
TOTAL	2. LUBRICATION	2. LUBRICATION
	(per year):	(per year):
2. LUBRICATION	Oil	Oil
(per year):	Grease	Grease
Axle Grease	TOTAL	TOTAL
TOTAL		

<div>3. CLEANING ITEMS (per year): Soap . . . Water . . . Rags . . . Sponges . . . Harness Oil . . . TOTAL</div> <div>4. OTHER EXPENSES (per year). Bedding (Straw) . . . Kerosene for wagon Lamps . . . TOTAL</div> <div>5. REPAIRS AND UP- KEEP (per year): Wagons . . . Or wagon rental . . . Harness . . . Shoeing . . . Veterinary . . . To buildings . . . Or stable rental . . . TOTAL</div> <div>6. INTEREST ON IN- VESTMENT (per year): (Figure 3% on total invest- ment.) Buildings . . . Land . . . Horses . . . Wagons . . . Equipment . . . TOTAL</div> <div>7. DEPRECIATION (per year): Stable at 5% . . . Horses at 20% . . . Wagons at 10% . . . Harness at 20% . . . Equipment at 10% . . . TOTAL</div> <div>8. INSURANCE (per year): Buildings, horse and wagon and equipment . . . Fire . . . Liability . . . Theft . . . TOTAL</div> <div>9. TAXES (per year): Land . . . Buildings . . . TOTAL</div> <div>10. LICENSE (per year) . . .</div> <div>11. MISCELLANEOUS CHARGES Salaries of drivers . . . Salaries of stablemen . . . Painting . . . TOTAL</div> <div>GRAND TOTAL . . .</div>	<div>3. CLEANING ITEMS (per year): Soap . . . Kerosene . . . Water . . . Rags . . . Sponges . . . TOTAL</div> <div>4. OTHER EXPENSES (per year). Radiator Mix- ture . . . Kerosene for Lamp . . . TOTAL</div> <div>5. REPAIRS AND UP- KEEP (per year): Chassis . . . Body . . . Tires . . . Parts . . . To building . . . Or garage rental . . . TOTAL</div> <div>6. INTEREST ON IN- VESTMENT (per year): (Figure 3% on total invest- ment.) Buildings . . . Land . . . Vehicles . . . Equipment . . . TOTAL</div> <div>7. DEPRECIATION (per year): Garage at 5% . . . Vehicles at 10% . . . Equipment at 20 to 33 1/4 % . . . 10% . . . TOTAL</div> <div>8. INSURANCE (per year): Buildings, Vehicles and Equipment . . . Fire . . . Liability . . . Theft . . . TOTAL</div> <div>9. TAXES (per year): Land . . . Buildings . . . TOTAL</div> <div>10. LICENSE (per year) . . .</div> <div>11. MISCELLANEOUS CHARGES Salaries of drivers . . . Salaries of garagemen . . . Painting . . . TOTAL</div> <div>GRAND TOTAL . . .</div>	<div>3. CLEANING ITEMS Soap . . . Water . . . Rags . . . Sponges . . . TOTAL</div> <div>4. OTHER EXPENSES (per year).</div> <div>5. REPAIRS AND UP- KEEP (per year): Chassis . . . Body . . . Battery . . . Tires . . . Parts . . . To building . . . Or garage rental . . . TOTAL</div> <div>6. INTEREST ON IN- VESTMENT (per year): (Figure 3% on total invest- ment.) Buildings . . . Land . . . Vehicles . . . Equipment . . . TOTAL</div> <div>7. DEPRECIATION (per year): Garage at 5% . . . Vehicles at 10% . . . Equipment at 5% . . . TOTAL</div> <div>8. INSURANCE (per year): Buildings, Vehicles and Equipment . . . Fire . . . Liability . . . Theft . . . TOTAL</div> <div>9. TAXES (per year): Land . . . Buildings . . . TOTAL</div> <div>10. LICENSE (per year) . . .</div> <div>11. MISCELLANEOUS CHARGES Salaries of drivers . . . Salaries of garagemen . . . Painting . . . TOTAL</div> <div>GRAND TOTAL . . .</div>
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Sanitation as an Aid to Sales

The Clean Bakery, in One Baker's Experience, Became His Greatest Baking Asset

By FENN O. STONE

IF you were going to baking school to learn your trade over again would you expect a teacher to hand you a scrubbing mop each day, and when you could come to the class in chemistry would you expect the teacher to instruct you as to the chemical reaction of soda, when applied in a bucket of suds, upon the bakery floor?

F. O. Stone, whose cake and bread baking experience has been very wide, knows to the last shade of an ounce just how much soda should go into a bucket of water to scrub, properly, a bakery floor. He told of his soda-washed floors as the biggest business getters he had. He predicted, in a talk to the American Institute's School of Baking, that business in the future was going to flow more directly in the path of the best sanitized plant than in response to any other stimulus.

The day after we heard Mr. Stone on his "hobby" of bakery cleanliness, as he called it, we visited for Thanksgiving day, a family in a small town near Chicago. The housewife stated she baked her own bread, "and every woman in our club bakes her own bread because we sent committees to investigate our local bakeries and found them unclean, while one of the bakers looked as if he had tuberculosis."

In the belief that Mr. Stone's words are vital, and have a meaning for every baker, we print here the message he gave to our student body:

Everybody has a hobby. Sometimes we discover our hobby late in life and it is

the result of experience, or a series of experiences that we have that finally seems to put a thought in our own mind. Because of this hobby they have made me Chairman of the Sanitation Committee.

A great many years ago, it might seem like that to you young boys,—it was about 1906, I became very much discouraged with the baking business. I had been working at it since I was fourteen years old. I went into the bake shop in the old days when you started three or four hours before the sun was up. 3 o'clock, 3:30 and then when you got through at 3 o'clock it was all done but finishing up. The finishing up job was a day's work as we count it, to clean up, gather the wood, clean up the bakery, wash the tins, set the sponge. It was 8 o'clock then and time to go to bed.

I followed that routine until I finally got in business for myself in Cleveland in a small way, and I learned to make cookies, cake and bread and about everything that was made in a retail bakery, but I couldn't make any money in it. **If the fellow across the way sold his bread for 5 cents, I did the same.** If he sold a dozen cakes for 10 cents, I did too. We both sold at the same price; that was the ground on which we had a mutual understanding.

After seven years of extremely hard work, about 18, 19 or 20 hours a day, I decided to sell out and go to the Chidlow School and find out whether there was a good way to make good bread and cake and at the same time make money. I had decided I would go to the Chidlow In-

stitute and find out whether a bakery could be run profitably and if not, I would change my vocation and learn something else.

Cakes and Cleanliness

I had always supposed, because earlier in life I was told, that a cake bakery could not be kept clean, that you used a lot of sugar, lard, butter and eggs and they stood around on the floor and spattered on the walls, and there wasn't any use to keep it clean because it was being dirtied up all the while. I went down to the Chidlow Institute and there I got my first inspiration. I looked that bakery over with more amazement than any young fellow ever exhibited in New York City the first time he saw it. I said, if a bakery can be run and make a profit that looks like this bakery, then I am going to stay in the business. **THAT BAKERY WAS IMMACULATE.**

They had colored fellows walking around in white suits wiping down the walls with brushes and everybody looked clean and happy. Nobody looked overworked. Every night we would look out of our door of the laboratory and see crowds of people going through with some well dressed young fellow explaining how they did it and what they did, and I was inspired. That was my first inspiration.

Everything Spotless

The next inspiration I had was when I visited H. J. Heinz plant in Pittsburgh. "One bright spot in Pittsburgh" they advertised it until the Ward Baking Co. put up their plant. I went through that plant and they use just as much sugar as a cake bakery and have just as much excuse for dirt as a cake bakery, **AND IT WAS SPOTLESSLY CLEAN**,—everybody, everything, the floors, walls, the girls, clean suits, everything was clean.

So I said, "I thought this was a dirty job."

They said, "It is."

"But I don't see the dirt," I replied.

"We clean it up" they explained and **I HAVE BEEN EATING HEINZ FOOD** ever since. I walk blocks and blocks and don't buy anything else because I saw that plant twenty years ago and it was spotless. Now, everybody is not as particular about what they eat, but I have always been a little fussy because my father was a doctor, so I have always tried **TO BE CAREFUL ABOUT WHAT I PUT IN MY STOMACH** so I wouldn't have to hire a doctor. That was my second inspiration.

My third inspiration came when after leaving the Chidlow Institute I came to the Columbus Laboratories, and after leaving them I went back to the Star Baking Co., the people to whom I had sold out. I took the job of superintending their factory, and I decided I wanted to go to a bakers' convention, so I looked over the list of places of interest that I wanted to visit between New York City and Cleveland. I decided that Kolb's Bakery in Philadelphia was something worth seeing, so I wrote to Mr. Kolb asking if he would permit me to go through the bakery. I got an awfully nice letter back from Lewis Kolb. I wish I had that letter; I lost it somehow or other. He was my third inspiration. I went to Philadelphia to see his plant and I was at the bakery at 7 o'clock.

Kolb's Bakery Inspiring

I wouldn't expect to find a boss of a bakery in his office at that hour these days and I wouldn't be disappointed not to find him. But in those days both L. J. and Charlie Kolb were in their offices when I called. I want you to think about that. At that time both were millionaires. I don't know how much Charlie Kolb was

worth when he died, but know he left two or three million dollars, and they made it out of a bakery that was "busted" when they took it over. And to think that a couple of fellows like that would waste any time on a young fellow like me was a big surprise, but I went there at 7 o'clock A. M. and left at 6 o'clock at night, staying there all day with the exception of going to lunch. They showed me everything, explained everything, then took me back to the office and there we sat, talking bakery all afternoon.

"It Can't Be Done"

One of the things that was astonishing to me was: I had always been trained to make a loaf of bread as big as could be made, that the public would not buy it otherwise, so we proofed as old as they could stand and then baked them just before going south. So I went into Kolb's bakery and he said, "How do you like our bread?" I said, "That's a small loaf of bread," and he said, "How does it smell?" "It smells good and looks good, but we couldn't sell a loaf of bread like that in Cleveland." He said "How much bread do you sell?" "We sell 10,000 loaves of bread a day." "I will show you how much we sell, some 350 odd thousand loaves a day in two plants," and I decided that if he could sell that much of that kind of bread I had the wrong viewpoint, so I had another inspiration. Here was another man doing something that I said could not be done, having been in the business since I was 14 years old. I have been very careful about saying that ever since.

Passing the Idea On

Now I am getting to my reason for being asked to say something to you boys. I want to be an inspiration to somebody. I have had three fellows inspire me, three fellows that stand out, George Ward,

Lewis Kolb and J. H. Heinz, and every one of them RUN CLEAN PLACES. That is their reputation and I honestly believe that THEIR SUCCESS IS FOUNDED ON CLEAN BAKERIES. I don't think it is because they made a small loaf, big loaf, good or bad bread, or because they knew anything at all. I believe it is because they had it within their soul to be clean and because they were clean they earned the respect and confidence of the public, and that is where you make the money. We cannot overlook the public. The public doesn't know a lot of things which you do, but they are going to find out a lot of things that you do and some way or another we learn that PEOPLE WHO ARE CARELESS ABOUT SOME THINGS ARE CARELESS ABOUT EVERYTHING, and if they are careless we don't want them to do a particular job.

The Institute's Ideal

This Institute stands for an ideal. The men who believe in that ideal have gone into their pockets and put back into this ideal some of the money they have taken out of the public's pocket in the baking business. I don't know of any better thing for a man to do if he has made a success out of a business than to put some of the money back into that business to make it a better business.

I have heard some bakers' wives say, "I don't let anybody know I am a baker's wife, they haven't a very good reputation, and I would rather not let anybody know my husband is in the baking business." THAT'S PATHETIC. It is time enough to make the business respectable enough so that they won't be afraid to say their husbands are bakers, and for that reason George Ward, William Deininger and a lot of other men have put money back into this institution to try and build up an ideal, and it is that their

daughters and their sons and sons' daughters and sons WOULD NOT BE ASHAMED TO SAY THEIR DADDY IS A BAKER.

But they are all going to be ashamed of it if all the bake shops of the country are conducted as the first ones I first learned my trade in. All the money in the world won't change the dirty shops even though you spend hundreds of thousands of dollars to make them beautiful on the outside. THEY ARE JUST LIKE THE BOYS IN SCHOOL WHO ARE DIRTY BEHIND THE EARS.

The first thing I would want if I sent a boy down here would be to have him learn how to scrub a floor. I know none of you has come here to learn that but I want to say that is an important thing to take care of. If you can find out how easy it is to scrub a floor so it will shine, you won't have to worry so much about whether your bread is underbaked or overbaked. IF YOU HAVE A CLEAN SHOP YOU ARE GOING TO MAKE DIVIDENDS.

Dividends from Scrubbing

You want to be clean. In our plant we have maple floors because, if you properly scrub them, THEY SHINE. They are just as clean and white as they can be. That is why we put maple floors in our shops. We found that if you use TOO MUCH WASHING SODA in scrubbing those floors THEY WILL SLIVER UP and go to pieces. One of the things you boys ought to know when you go home is how much washing soda you need to put in a gallon of water to scrub a floor and make it clean. That is JUST AS IMPORTANT AS HOW MUCH YEAST YOU ARE GOING TO PUT IN 100 LBS. OF FLOUR FOR A DOUGH.

Ladies See the Point

I was showing some ladies through our

Atlanta plant one day and I said to the ladies,—it was a Mothers Club—"We didn't just scrub this floor to show you folks through because we scrub it every day, and we would like to have you come back some day unexpectedly without calling us up beforehand." One replied, "I have scrubbed enough floors to know how water looks upon a floor, to know whether it has just been scrubbed for this day or is scrubbed every day. All these ladies may not know this, but I do. This floor has been scrubbed every day."

Somebody wrote a very good slogan in Baking Technology a week or two ago. They stated it: "The Association maintained by the industry for the industry." That means that you boys are going to contribute AS MUCH TO THE INDUSTRY as the men who have built or purchased and are maintaining this institution. We are all doing it for the industry. Bennie Weil has a plant in Cincinnati that you can be proud to refer to as one of the plants belonging to the baking industry. I don't have to talk to his son about his shop. They advertise it as the "Sunlit Bakery on the Hill." That is a very fine slogan and the fellow who thought of that slogan knew what the public was trying to find out about bakeries. They knew the public wanted a clean place so they built a bakery on the hill full of windows and advertised it as the "Sunlit Bakery on the Hill."

There are things you cannot get in any chemistry room and cannot get in a lot of other places, but you will get things you need and ought to know, but don't overlook the scrubbing and look down upon the task of learning how to keep a clean bake shop. I WOULD LIKE TO SEE THE BOYS THAT LEAVE THIS SCHOOL LEARN ONE THING WELL, AND THAT IS, HOW TO KEEP IT CLEAN.

Over the Top at Our School

Baking Students Crowd the Institute's Classrooms to Full Capacity for the First Time

By JULIAN LIVINGSTON,

Chairman Institute Committee of the American Bakers Association.

FOR the first time since the American Institute of Baking threw open its doors, students are learning the scientific problems of the bakeshops in full classes, and WITHOUT ONE CENT OF EXPENSE to the industry as a whole.

Thus comes true the vision of the few hardy pioneers who decided that the time had come for the Industry to educate its own future leaders.

When the School of Baking was first talked of so many things were said by Mr. Gloom and Mr. Doubtful and Mr. Distrustful, that it is now more than humorous to think back at all their dark forebodings.

Up came the little baker, for instance, who insisted that he would not join the National association because he was ready to "let those that got the benefit of an education to pay for it."

This criticism was met by others in the industry when they said that they themselves were seasoned veterans of the baking industry and had made money out of the industry. Therefore, they argued, they wanted to put some of this money back into the industry to build for it a better name, to gain more public recognition, to gain a trained personnel for the future years when a new generation of leadership should spring into existence. These pioneers were thinking of service, not of returns from the Industry.

They put up their money to found the American Institute and to welcome students to a thoroughly equipped school, with plenty of shop room, experimental bakery room, and classrooms for lectures.

At first only a few students appeared for enrollment. Then came along Mr. Gloomy, who said we were founding a university without looking for high schools as the underpinning.

They thought the resources of the Association ought to have been spent in sending teachers here, there and everywhere, as opportunity to give short courses in baking might arise. For all these critics the work of teaching the young men who appeared went right on.

Finally came the New Year of 1923.

For the January Class it was decided twenty-four students would make a class full. Under the new system of class room regulation no more students than this number could be accommodated. Fees were fixed which would just make the school self supporting if twenty-four students should enroll.

Boldly the Governors of the American Bakers Association, while at the task of cutting the budget for 1923 down to the smallest possible figure, cut the School of Baking out of the budget entirely. The school, they said, must stand upon its own feet or perish. Faculty members in this pioneer undertaking felt nervous a bit, but they soon learned that the Industry was hunting them as much as they were seeking to serve the industry.

In came the students,—one enrolling at a time until more than twenty had put down their names. Two more appeared from Chicago. Two old students decided to get a little more acquaintanceship than they had with baking problems.

Thus the first class of the American In-

stitute of Baking filled itself up to the brim and to the point of overflowing! Thus disappeared all the prophecies of those who said the "school was ahead of its time." And the prophecies of those who said "the school would never get to first base." With these prophecies of the Faint Hearted there disappeared also the excuse of Baker O'Grouch, who hated to see a single cent of his precious dues money going for the education of the young. With the coming of the first full class came also the first chance of the School of Baking to WRITE ITSELF OFF the expense list of the Institute.

From now on the school is sure to be self supporting.

More Cost Accounting

For the January course important changes have been made from the first experimental courses. Practical bakers who looked over what the students were learning wanted to see more attention given to keeping a bake shop in the black side of the ledger. As a result, a division of time was made into three classes.

First the student has a third of his time assigned to the class room. From faculty members he hears in the class rooms of the theory of baking. Then a third of the student's time goes to the experimental laboratory. Here he applies the lessons of the class room on a small scale. Finally a third of the time goes to the shop. The students here send shop-sized doughs through all phases of bakery practice.

But in the shop from now on the squads will be divided, and half will make up cost sheets on the ingredients mixed by the other half. Thus each student will get a rigid training in what it costs to make a loaf of bread as well as in baking chemistry and the problems of fermentation.

It was a fine thing to see so many sons of bakers in the 1923 enrollment.

The full list of students enrolling, is as follows:

Those Enrolling

- Raymond Bohn, (Perfection Biscuit Co.)
Ft. Wayne, Ind.
- Frank J. McDonough, (Cushman Sons, Inc.)
New York City.
- Otto Schmitt, (Grant Baking Co.)
Chicago, Ill.
- Ralph Seeley, (Seeley Bakery)
Hicksville, Ohio.
- Adolph C. Jacobs, (O & A Jacobs Bakery)
Creighton, Nebr.
- Wm. Vogel, (Taggart Baking Company)
Indianapolis, Ind.
- L. K. Abrams, (Livingston Baking Co.)
Chicago, Ill.
- James R. Harris, (Harris Boyer Co.)
Johnstown, Pa.
- Henry C. Scott, (Hazelton Baking Co.)
Hazelton, Pa.
- Loraine Sultzman, (Sultzman's Bakery)
Hannibal, Mo.
- Cecil Garrison, (Hub City Baking Co.)
Oelwein, Iowa.
- Ray L. Farlin, (White Front Bakery)
Webster City, Iowa.
- Rex Schmidt, (Matthaei Bread Co.)
Tacoma, Wash.
- J. E. Pass,
Chicago, Ill.
- Mr. J. M. Carpenter, (M. Carpenter Baking Co.)
Milwaukee, Wis.
- Robt. P. Wirth, (The Fleischmann Co.)
Chicago, Ill.
- Wm. Schaefer, (Nafziger Baking Co.)
Kansas City, Mo.
- Frank Kessler, (Oswald-Jaeger Co.)
Milwaukee, Wis.
- Ho Kam Hon, Honolulu, T. H.

Students Holding Over

- Wilbur Cushman, (Cushman's Sons, Inc.)
New York City.
- Robt. M. Woods, (Ward Baking Co.)
New York City.
- Henry Stein, (Perfection Biscuit Co.)
Fort Wayne, Ind.
- Oluf Petersen, (Petersen & Pegau Baking Co.)
Omaha, Nebr.
- Alfonso Velasco
Mexico City, Mexico.

Holding Flour for the Future

The Story of Flour as it is Stored in the Bakery

THE first thing the baker must do upon receiving flour is to put it into a clean, well ventilated room, properly spaced for good air circulation.

There is a great difference of opinion as to how long a flour should be stored before using, in order that the best results be obtained. There is during storage an increase in the hydrogen ion concentration (free acidity). This increase is quite slow, taking months to reach the highest point. The increase in hydrogen ion concentration causes an increase in loaf volume and better crumb color occurs, with a decreased absorption. The moisture content must be taken on each analysis and the absorption figured to the same moisture basis.

The baker usually has from one to five different brands of flour in his plant and blends them with the idea of guarding against an ununiform finished product in case one or two brands should not turn out properly. This idea is losing some of its weight, for it is often possible to purchase a large quantity of flour from a reliable mill of uniform grade and quality at a lower cost than the total could be purchased from several mills, and with a finished product equally as good.

Bakers See the Light

Flour is certainly a most important food to humanity, and more research work should be done by the miller who thinks it unnecessary and by the baker who is beginning to see the light.

Two flours of the same analysis of ash, protein, and moisture may have widely different fermentation periods. Some bakers have tried to purchase on ash content

only, some on washed gluten only, and some on protein only, without any of them increasing the uniformity of their finished product or arriving at any well balanced conclusions.

The information obtained from research would indicate that the miller will have to change his method of control, since he has been relying on a given ash, moisture, and protein content to give him a uniform flour. This change seems necessary since none of the above mentioned factors for control can be relied upon. It quite often happens that two cars of flour of the same brand and striking a balance on the ash, moisture and protein will, when handled alike in the shop, give a large difference in the finished bread. The baker then has to change his fermentation period, and the difference in fermentation period of flours with identical analysis is caused by the buffer action of the two flours. The buffer action can be easily determined with the hydrogen ion apparatus.

Hydrogen Ion Concentration

Another case controlled by the above condition is that of a clear grade flour and a short patent from the same run of wheat. It is generally known that the clear has a higher total acidity (obtained by colorimetric titration) than the short patent and a longer fermentation period. It is also known that the hydrogen ion concentration of the clear with a higher percentage of protein, which is much weaker, is lower than the short patent with a higher buffer action. The higher buffer action accounting for the longer fermentation period.

There is some very good work being done on the viscosity of an aqueous flour extract, and its bearing on the quality of the flour for bread purposes.

The Problem of Rope

Rope is another big problem for the miller and the baker to solve. It cannot be denied that flour is nearly always contaminated with rope (*Bacilli Mesentericus*). Some flours have a higher concentration than others, and where the concentration goes above a certain count, it is a sure thing that the baker will find the evidence in his finished product. This is not necessarily the fault of the miller, neither does it relieve him entirely of the blame, for he should make some effort to free his wheat from this bacteria before the wheat goes to the roll.

This is another typical example where scientific research would help the miller, and while the present methods of scientific control of the production of uniform flour by the Miller and the methods used by the Bakers in protecting their purchases are far ahead of the old Rule and Thumb methods, the field is wide open for improvements that will not only make a more uniform flour and a more uniform bread, but will greatly reduce the production cost.

The same amount of ash and protein in every ear of flour does not rid the baker of a finished product varying widely in its quality. Such analysis can only be used to assure the baker of receiving the grade of flour purchased. The fermentation period as stated above varies and should be watched and made one of the controlling factors in a bakery laboratory, since the shop superintendent will have to vary the fermentation when the ear is received and he should have a knowledge of the change in advance.

C. J. PATTERSON.

Wanted—a Handbook

SCARCELY a week passes without bringing to the Northwestern Miller one or more requests for information covering the manufacture and marketing of wheat flour. It is monotonous to repeat in letter after letter that there is no such handbook of flour milling and marketing."

—The Northwestern Miller.

The Miller has here hit upon one of the live problems that interest bakers of all kinds and millers alike. Bakers are learning more and more to buy on analysis and not by brand. They find by experiment the truth which the Miller sets forth when it says that there is "need for official formulation of familiar trade terms." The Miller proposes that some industrial school give milling "the attention it deserves," as a preliminary to getting out the needed handbook. We might add that such a book will not be of much value unless it takes in every need and problem of the baker. As the largest user of millers' flour the baker should be more consulted than any other outside group in the preparation of the handbook proposed.

In the bakers' National home there is much talk of a new "Book of Bread" to bring together the latest scientific discoveries about bread-making. Why shouldn't this book be a joint work of millers and bakers, to set forth all the facts that are common to the interests of both?

"I have just gone through the December issue of Baking Technology and cannot refrain from telling you how good I think it is. The paper is improving right along, and contains a vast amount of readable stuff. Keep the good work going."

—Robert T. Beatty—Editor Northwestern Miller, 12/28/22.

WHAT SCORE DID OUR SERVICE DEPARTMENT GIVE YOU ON YOUR BREAD LAST MONTH?

Homogenizer Reduces Losses

Report of Experiments Conducted at the American Institute of Baking

By A. W. LANDSTROM

IN the last issue of BAKING TECHNOLOGY the results of a series of shop experiments on the use of the homogenizer in emulsifying certain ingredients of the dough batch were reported. This work has been continued and this article describes further experiments showing the effect which homogenization of ingredients has upon weight losses of bread stored under the same conditions for different periods of time both wrapped and unwrapped.

The equipment used was the same as that used in the work referred to above. The method of experimentation was changed in that a different flour was used with a slightly different formula, and doughs of the same absorption were run one hour apart so as to obtain as nearly as possible comparable conditions of storage after baking. One hundred and fifty (150) pounds of flour were used for each dough and three different absorptions studied as before. The results of the two experiments on absorptions of 2.5% over the normal were unsatisfactory and for this reason are not considered here. Doughs numbered 12 and 16 were controls and were made in the usual manner; numbers 13 and 17 were made using homogenized ingredients.

FORMULAE USED IN PER CENT

Dough Number.....	12	13	16	17
Flour (Pillsbury XXXX) ..	100	100	100	100
Sugar	2	2	2	2
Salt	1.75	1.75	1.75	1.75
Yeast	2.5	2.5	2.5	2.5
Water	62	62	67	67
Shortening (M. F. B.)	2	2	2	2
Skimmed Milk Powder....	6	6	6	6
Malt Extract (Diamalt) ..	1	1	1	1
Yeast Food (Arkady) ....	.25	.25	.25	.25

Details of Experiments

As mentioned above the making of emulsions and the mixing procedure were the same as for the series of experiments reported last month. For the sake of convenience the "homogenized" dough was mixed before the control dough of the same absorption. This will explain why the oven temperatures given for doughs 13 and 17 are higher than those for doughs 12 and 16. These temperatures were observed just before the batch of bread was put into the oven. Immediately upon coming from the oven all of the bread from a given dough was weighed, the temperature and humidity of the room noted and the bread allowed to stand packed on racks in the usual manner for one hour. The temperature and humidity were noted and the weight again determined to obtain the "one hour loss." About one-half of the loaves were then wrapped using a "Hayssen" bread wrapping machine. Data upon the wrapping paper used is given later, under the heading of "Analysis of Materials."

The wrapped loaves were then weighed and returned to the racks. They were reweighed as was the unwrapped bread after 23 hours. The temperature and humidity of the storage room were determined after approximately 12 hours and again after 23 hours. The temperature of the dough, the time of fermentation, the time of baking and the temperature of baking were noted. No data were kept on the temperature or humidity of the dough room or shop or the dusting flour used, but care was taken to make these factors reasonably the same from dough to dough. The dough was

weighed out of the mixer as a check on the accuracy of scaling and to insure against omissions of materials. No determinations of moisture on baked bread were made as the weight losses of the entire number of loaves resulting from a bake were thought to indicate more accurately the tendencies studied. Due to variations of temperature in different parts of the oven it would have been very difficult to choose representative loaves for this determination of moisture content.

The same methods of analysis were used as were previously reported.

Calculations

Weight losses are expressed as per cent of the weight of bread "out of the oven." The weights of "wrapped bread" "out of the oven" were calculated from a count of the loaves used for wrapping and the total number of loaves from a given dough and the corresponding weights of "unwrapped bread" were obtained by difference from the determined weight of the entire bake as it was taken from the oven. The same method was used to arrive at the weights of "wrapped" and "unwrapped" bread one hour out of the oven since it was at this time that the bread was wrapped and the weight of the loaves after wrapping determined.

ANALYSIS OF MATERIALS

Water Content

Flour	12.52
Sugar .....	.07
Salt .....	.19
Yeast (Average of all exp.).....	67.07
Shortening .....	.04
Milk Powder	4.30
Malt Extract.....	22.45
Arkady	8.14
Emulsion	60.10

The paper used for wrapping bread was of the paraffin coated, self-sealing variety, unprinted. The average weight of one square foot was found to be 0.129 oz. with the setting of the wrapping machine employed the size of the sheet of paper used per loaf was 1.774 square feet. Upon analysis it was found that 24.63 per cent of the weight of this paper was wax (ether soluble material).

Discussion of Results

This series of experiments has confirmed the preliminary observations as to one hour and 24 hour weight losses of bread given in the November number of BAKING TECHNOLOGY. The agreement is not exact, the changed formula might account for this, but the same tendencies are shown as were previously indicated. Some doubt existed as to the correctness of the one hour loss of .53 per cent

TABULATION OF RESULTS

Number of dough.....	12	13	16	17
Absorption—Per Cent.....	62(normal)	62(normal)	67	67
Temp. of Dough—Deg. Fahr.....	81	82	81	81
Ferm. Period—Minutes.....	112	120	119	133
Baking Period—Minutes.....	49	50	47	44
Oven Temp.—Average.....	468	493	483	513
One Hour Loss—Per Cent.....	1.61	.64	2.91	1.76
Storage Conditions For First Hour—Temp.....	80	80	78	79
Storage Conditions For First Hour—Humidity.....	44	47	53	51
Wrapped Bread—Loss for 23 hrs. after 1st hr.....	1.02	1.27	2.48	2.85
Unwrapped Bread—Loss for 23 hrs. after 1st hr.....	5.81	6.62	6.57	5.53
Storage Conditions—Avg. Temp. for 23 hrs. after 1st hr.....	79	79	72	72
Storage Conditions—Avg. Humidity for 23 hrs. after 1st hr.....	41	42	50	49
Wrapped Bread—Total Loss 24 hrs. from oven.....	2.63	1.91	5.39	4.61
Unwrapped Bread—Total Loss 24 hrs. from oven.....	7.42	7.26	9.48	7.29

determined in the previous work on the normal absorption bread using homogenized materials. Since we have obtained .64 per cent on the corresponding experiment of this series, it now appears that this figure is fairly correct. This diminished weight loss for the first hour of storage due to the use of homogenized ingredients is further confirmed by the results obtained on the dough containing 5% over the normal absorption, the difference here being 1.15% in favor of the "homogenized" bread. The data on losses for the 23 hours following the first hour for the wrapped bread and, with the exception of the result on the 67% absorption "homogenized" dough, for unwrapped bread show an interesting tendency: namely, that it seems as if the protective effect of homogenization upon weight losses on storage is greater at the early stages of this storage. In fact it is of such magnitude that in spite of the greater loss which a storage period of 23 hours after the first hour shows for "homogenized" bread as compared with "non-homogenized," the total losses for 24 hours after the bread was taken from the oven are less in the case of the former. Since this report gives the results of experiments carried out under shop conditions and is intended primarily to indicate tendencies and point to further more exact work we will not at present attempt to explain this phenomenon. Considering the oven temperatures given it appears that the baking periods of about 48 minutes were longer than is customary in practice; however, since these temperatures were determined just before the bread was put into the oven they are approximately 20 degrees higher than the temperatures at which the bread was actually baked. Further, the one hour weight losses are only slightly lower than those taken from data, as yet

unpublished, obtained by the writer in a large commercial bakery with average temperatures determined during baking of about 450 degrees and an average baking period of approximately 35 minutes.

Conclusions

As in the previous report on this process any conclusions drawn must be limited in their interpretation to the conditions of these experiments, medium speed mixing, and other machine conditions peculiar to the School of Baking shop, and the particular formula used. With this in mind it seems from the above data that again homogenization has been shown to be an improvement over the ordinary method of mixing bread ingredients. Weight losses during a storage period of one hour after baking appear to be reduced as a result of the application of this process, and further the same result appears to have been accomplished by homogenization in the case of the total weight losses for both wrapped and unwrapped bread over a storage period of 24 hours from the time bread was taken from the oven.

In Darkest Russia

SOVIET Russia may be the darkest spot on civilization's map, as we so often hear, but the National home of the baking industry has seldom, if ever, received a more alert or interested visitor than D. N. Bordoni, representative of the Russian Agricultural Bureau. Mr. Bordoni came to obtain data about the American baking industry for the Russian Central Scientific Bureau.

When he saw Harold Turley's mold gardens, he wanted to know the name of every single mold so far discovered, and also its habits of growth. When he was shown a copy of one of our scientific bulletins there was no peace in the house

until he had all of them. And his interest in each was aggressive, intelligent and responsive. A glimpse of the machinery in our shop led to his demand for the name of every modern baking machine which we could recommend as of possible value in Russian bakeries. It was the same with the flours we were using. Not only did he carry away a sample of everything he could get us to let him take, but he asked that a duplicate set be sent to Petrograd direct.

The Central Scientific Committee, he hoped, would send some students. Mexico City has already done so. Hawaiian bakers are talking of doing it. The Russians may be a benighted people but if the Central Scientific Committee's four hundred scientists listen to Mr. Bordoni with anything like the eagerness he listened to L. A. Rumsey and other scientists of our laboratories, then they are surely going to learn much of what scientific baking means in the United States.

Rumors vs. Facts

HERE is the kind of a letter we like to receive, for it shows that the baker rather calls our attention to a possible danger than to nurse it at home as a grievance.

"We notice," writes this baker, "that a price war has broken out in Toledo, Ohio, it being started by the Ward Baking Co. We think this is going to do the association a great deal of harm coming from so prominent a member as Mr. Ward. It will surely hamper you in your efforts to expand."

We looked up the case, naturally. As the Ward Baking Co. has no plant in Toledo this much of the rumor was of necessity a misunderstanding.

Then we encountered a set of state-

ments that make all these wars so unfortunate. No two persons whom we could reach agreed in any way about who "started it" and what the fight was about. Everybody had a different version. All the versions had to do with queer ways of selling bread besides the simple and direct way of offering it on its merits. In such a case, elsewhere the story ran: One baker was accused of having given away doll babies. Another was accused of having given away jumping-jacks until the doll baby giver felt he just had to retaliate and go the jumping-jack baker one better. Then entered a boy's-kite baker. He did not believe going into the knick-knacks business, nor the kite business instead of selling bread. But since the other fellow was in the doll baby business he really felt impelled to go into the kite business.

When at last the bakers were brought together in one room, and could thresh it all out together they found this peculiar TRUTH. All had been fooled by a designing grocer. He had told first one and then another that someone in the group had offered to cut the standard price to him, as a special concession, by half a cent or a cent. Thus the designing grocer worked up dissension, mistrust, and a feeling that each baker must outplay "a smart rival."

The pity of it is that these fights have to run their course to the point of exhaustion of everyone on all sides before those involved can be brought together to smoke the pipe of peace. Only when bakers vision the great unsold section of the public and unite to gain this new trade will these fierce battles subside. This is another way, of course, of saying that more organization is the cure, not less, as so many insist by resigning at the first blow of Trouble's winds.

Standard Bread Weight Bills

Views of Various Bakers as to Legislation that may be Impending

IN NO question, where there are so many sides to consider as in that of standard weights for bread, is it possible to get complete agreement of views. In New England Alton H. Hathaway has gained fame and a good name for a special loaf weighing one pound five ounces. It carries the name in the case of the Hathaway company of "Celebrated Cream Bread."

Mr. Hathaway naturally fears that a blanket law, making no exceptions for special loaves such as this, will do much harm and little good. He seeks special quality, yet faces the problem of selling higher quality than usual at a standard price. For eight months or more he carried this loaf at a cent above the standard market, but finally came into price agreement with the market. He then faced the problem of taking out the extra quality or printing the weight on the loaf, showing it was lighter than the ordinary loaf sold at a similar price.

"We believe," writes a member of the Hathaway firm, "that a very high quality loaf can be successfully marketed at the popular price, but of slightly less weight than the plain bread, and that so long as we print the proper weight on the wrapper, we should be allowed that privilege."

On the other hand, in parts of several western states where local ordinances require standard weights, shippers send in competing bread at lower price, but also at less weight. The bakers bound by the city statutes demand a state-wide law to put all competition on a similar basis.

From Jay Burns comes a letter commenting rather clearly on the standard weight law which we printed last month.

This is the bill drafted and recommended by the Fourteenth Annual Conference of Weights and Measures Officials during a meeting at the U. S. Bureau of Standards, Washington, D. C.

The bill is recommended for adoption in all states, and is being sponsored by folks who have no personal knowledge of the needs of the baking business. They are folks interested in weights and measures bills in general. In some states, such as Massachusetts, they have left a leeway for special and fancy breads.

In stating his opposition to the Bureau of Standards bill Jay Burns objects that our publication of it last month, "conveyed the impression by inference that bakers' committee were in accord with this proposed law." It was printed as "news" with an invitation to all bakers to send us their comments on it, and in no way was consciously indorsed.

Committees Disagreed

"The facts," continues Mr. Burns, "are very far from this. A committee consisting of R. M. Allen, H. E. Barnard, and myself, with C. J. Kremer of the National Retailers' association, met in Detroit in August with a committee consisting of two representatives of the Association of Weights and Measures officials and a representative of the Bureau of Standards.

"We met to discuss bread weight legislation. I went to that meeting with the expectation that the whole subject of Bread Weight Legislation would be discussed. But we found when the committee convened that the government representatives were limited to a discussion of **tolerance** only, as applied to standard weights, and were not open even to

discuss other phases of standard weight laws as applied to bakers.

"Our committee refused to discuss in detail the question of tolerances—unless we could go into the whole question of standard weight legislation and the conference was deadlocked on that point.

"We did submit a copy of the Massachusetts Law, which provides for standard weight loaves, but which permits the sale of loaves of other sizes than those specified, provided such loaves are labelled with their true weights, as embodying the only character of Bread Weight legislation which we could indorse.

"It was also suggested that additional provisions might be made for placing of signs or placards, indicating bread weights in cases of bread being sold on the premises where baked, to relieve the retail bakers from the necessity of labeling.

"I am still unalterably opposed to specific bread weight laws as being inimical to the interests of both the public and the baker.

Proposed Law Objectionable

"The draft of a law published in your November issue is less objectionable than some laws which have been suggested, and than some laws which are now in force—but this law is very objectionable. There is no sound reason for the limitation on twin loaves and no sound reason for prohibiting the manufacture of three-quarter pound or one-and-one-quarter pound loaves. In fact there is no reason for any restriction on sizes of loaves beyond the requirements that all loaves shall be plainly marked with their net weight—except to satisfy the ego of the official who wants to see a standard fixed for every commodity—quite regardless of whether such standard is applicable.

"The facts are that weight standards—as applied to bread, are meaningless so far as conveying information as to the loaf value is concerned, and instead of simplifying the sale of bread, they serve only to impress false measures of value and produce confusion.

"The net result of the enforcement of standard bread weight laws will be to increase the cost of bread to the public—and that will in turn stimulate home baking and limit the field of service in which the **modern scientific baker** can outstrip the housewife in the production of a properly balanced loaf of high food value."

Retailers Have Bill

Another new angle on the Standard Weight matter comes from the Retail Bakers Association of America. Its secretary, John Hartley, has addressed a letter to F. S. Holbrook, chairman of the Conference Committee on Bread Weights and Tolerances, at the Bureau of Standards, Washington, D. C.

In this letter The Retail Bakers Association takes the stand that by drafting a new measure of its own "it may by taking the initiative stimulate them (the American Bakers Association) to action with the result that the stalemate now existing may be broken."

The tentative draft of a bill indorsed by the Retailers, is as follows:
Tentative Draft for Standard Bread Weight Law.
Prepared by Retail Baker's Association of America.
Mr. C. J. Kremer, Chairman, Bread Law Committee.

The people of the State of.....
do enact as follows:

1. All bread manufactured, procured, made, or kept for the purpose of sale, offered or exposed for sale, or sold in the form of loaves, shall be of one of the following weights and no other, namely, one pound, one and one-half pounds, or multiples of one pound avoirdupois weight.

2. The weights of individual loaves of bread shall be ascertained and computed by

weighing at least ten loaves of the same nominal weight and the same manufacturer and a variation or tolerance of one ounce in excess and one ounce in deficiency per pound of the weights provided for in section 1 shall be allowed; provided however, that wherever less than ten loaves of the same nominal weight and the same manufacturer are available in any place where bread in loaves is made, or offered, or exposed or kept for sale, or sold, the weight shall be ascertained and computed by weighing all available loaves of the same nominal weight and the same manufacturer, but in no case shall less than five loaves be computed, and provided further, that in no case shall there be allowed a tolerance or variation of more than one ounce in deficiency and one ounce in excess per pound of the weights provided for in section 1.

3. The provisions of this act shall not apply to rolls, buns, biscuits, crackers and similar articles weighting less than four ounces avoirdupois each, nor to stale bread provided that such bread be conspicuously marked "stale bread," or placed in a container conspicuously marked "stale bread," and sold as and for stale bread.

4. Any person who shall by himself or his servant or agent and any firm or corporation who shall by themselves or their servant or agent or as the servant or agent, of any other person, firm or corporation manufacture, procure, make, or keep for the purpose of sale, offer or expose for sale, or sell bread in the form of loaves of weights other than provided for in section 1 of this act and within the variations and tolerances provided for in section 2 of this act shall be deemed guilty of a misdemeanor and shall, upon conviction thereof be punished by a fine of not less than twenty-five or more than two hundred dollars, or by imprisonment for not more than ninety days, or by both such fine and imprisonment.

5. It shall be the duty of.....
to enforce the provisions of this act.

With these various activities, the matter of bread weight legislation may be considered rather indefinitely at many state legislative meetings in the new year. It has become rather a fashion for groups in various states to put through "uniform laws" wherever some standard law is drawn up and proposed for universal adoption.

New England Takes Action

In conformity with its wish for standard laws the members of the New England Bakers Association voted at their December meeting to seek ONE UNIFORM law for all New England states. They adopted the Massachusetts law as a model, and to make their purpose clear they passed a resolution brought forward by Mr. Shepard. It read:

Resolved: That this association favors the introduction and passing of laws by the various law making bodies of the New England states, governing the baking industry in all matters that should be controlled by state law. The general scope and detail of these laws shall be along the lines of the present bakery law of the State of Massachusetts and the officers of the legislative committee of the New England Bakers Association are hereby instructed to take such action as will accomplish the best results.

Under President Walter H. Dietz, who has done splendid work as Secretary in building up the New England association, it will press forward along the lines here laid down.

Doubtful in Salt Lake

While in Honolulu they want strong legislation to protect American bakers from oriental competition, where common standards are in no way in existence, in Salt Lake City bakers are doubtful as to the value of the Massachusetts law.

"We prefer," writes George Mueller of the Royal Baking Co., "our own law which provides that bakers must have their names printed on each loaf, and must also show the loaf's weight in ounces. So if a pound of bread weighs one pound and an ounce or a pound and two ounces, it must be so marked.

"We have found this law very satisfactory to the baker as well as to the public. According to the writer's idea the proposed new law requiring bread to be baked in loaves of one pound, a pound and a half, etc., would work a hardship on both

the baker and the public. Take for instance the fact that flour prices are always going up or declining. With a standard weight loaf the baker could not vary his loaf's size to keep its cost steady, but would have to wait until flour went up enough to justify him in adding another cent to the cost before he could help himself at all.

"It is a fact that the ordinary baker is so afraid of adding to his selling costs that in a rising market bakers often maintain old prices until they are almost broke. On the other hand, while the price of flour is falling, a baker can not, under a standard weight law, give the public any benefit until the drop has reached a point where he can cut a whole cent from his selling price. In other words the law would force the baker, at such a time, to be a profiteer.

"Such a law would force the baker at one time to make too much profit and at another time to make too little profit. It would bring antagonism against the baker every time the public might notice a falling flour market. In our state the law enables us to follow the Costs Market, and to add a little in weight as costs go down while taking it away again as costs go up. We keep the price to the public per loaf at the one accustomed level.

"Very likely, as the only excuse for a new law, the politicians will bring forth an assertion that it protects the public. But as profit to bakers is only a small fraction of a cent per loaf, the politicians speak in ignorance of the facts. You are surely well enough aware of the fact that competition in baked goods is so keen that no baker can sell his product at more than just a fraction of a cent per pound over actual cost of the ingredients, plus labor. Should the bakers in any city combine as a whole, even, the best they could do would be to bring on home baking as a

corrective. The housewife remains in our country the greatest competitor of the baker. Because of this general situation the new law as outlined in *Baking Technology* for November, would be, in our opinion, a burden to bakers without in return being of any benefit, either to the baker or the public."

It is by exchanges of opinion like this that a desirable policy will at last be worked out. Who else has an opinion of standard weight laws?

Bakers and Chickens

IF MEMBERS of the baking industry sigh in sorrow because foolish bakers lose their tempers with one another and launch into disastrous wars that bankrupt all involved, then consider the sad case of the fellow who owned prize-taking White Wyandottes.

He took eleven young cockerels to a chicken show. While they could rub neck feathers with one another they grew up as brothers in peace. But when separated even for a single week they completely forgot their brotherhood. Once released in the barnyard after the show, they flew with one accord at one another's throats.

When the harried poultryman could get his broom into action to sweep up the mess he didn't have a cockerel left. All there was fuss and feathers. The answer, of course, is that the one sure cure for evils in the baking industry is organization—more and more organization. Organization in each city. Organization in each district. Meetings as often as possible.

We are quite in sympathy with a Journal of this kind, and feel that you are in a position to help not only the baker in your organization, but also the allied industries—particularly the flour millers.

—M. A. Gray, Pillsbury Flour Mills Co.,
Minneapolis, Minn.

Books for the Baking Laboratory

MICROBIOLOGY OF FOODS. Dr. Albert Schneider, P. Blakeston's Sons & Co., Philadelphia, Pa., 1920. 256 pp. 131 fig.

Dr. Schneider of Columbia University has prepared a valuable reference book which should find a place in each baking laboratory which desires to make systematically or only occasionally microscopical studies of the baking materials.

It covers concisely the whole field of food spoilage, giving sufficient details to enable the beginner or student of microscopy to arrive at fairly accurate estimates of the true condition or adulteration of the material under examination.

A brief survey is given of the organisms that cause food spoilage but there is no detailed discussion of any particular organism.

Many specific tests are given. Those of interest to the baker are given as follows: identification of starches, fats, plant fragments, treated milks, and the examination of flour, bread, cereal products, spices, butter, etc.

The food ratings established serve only as a guide to one who desires to establish his own comparative analytical ratings for the systematic study of his own materials. For example, arbitrary standards for flour are set at 500,000 to one million bacteria, only a trace of mold spores and no mold threads per gram of flour.

Legal standards of purity are included, with sufficient discussion to enable the baker to know whether his products are fraudulently misrepresented.

HAROLD E. TURLEY.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Shortening the process of digesting in protein determinations of wheat and flour. R. K. Durham. *Modern Miller* 49, No. 24, 26.—A series of determinations of nitrogen was made by the Kjeldahl-Gunning method on a sample of flour of unknown protein content. Forty minutes was found to be the minimum time for digestion. Experiments were made on the same flour by the same method as above but modified by the addition of 1, 2, 3, and 4 cc. of 60% HClO_4 . Best results were

obtained by using 3 cc. of HClO_4 and digesting 20 minutes. Ruth Buchanan.

Rope (and sourness) in bread, together with a method of estimating heat-resistant spores in flour. D. J. Loyd, A. B. Clark and E. D. McCrea. *J. Hyg. (Cambridge)* 19, 380-93.—The skins of grains, all flours and all bread contain bacteria belonging to the group *B. mesentericus*. The cultural characteristics of 6 types of *B. mesentericus* isolated from grain and flour are given. Five of these were also obtained from ropy (or sour) bread. None of these 5 types can be identified as corresponding to organisms isolated by earlier workers on rope. Rope or sourness does not result from the presence of these bacteria unless conditions are such as to allow of great development. The factors determining development of rope in bread are (1) degrees of infection, (2) moisture, (3) temperature, (4) reaction, (5) composition of flour. Ruth Buchanan.

Maturing flours. F. L. Dunlap. *Chem. Met. Eng.* 27, 174-7 (1922).—A résumé of the value of treating flour with Cl_2 to produce a product in which the H-ion concentration is such that the flour gives baking results similar to those of flours aged to their optimum point. Cl_2 stabilizes the baking value of such flours for a prolonged period. Ruth Buchanan.

The diastatic action of malt flour and of the other malt preparations (liquid, pasty and dry extracts). Raoul Lecoq. *J. pharm. chim.* 25, 18-25 (1922).—The optimum temperature of diastatic action on starches is 75 degrees. Malt flour has the full diastase content of the malt, with small amounts of maltose, while com. extracts are rich in maltose, but deficient in diastase, which has been partly destroyed in the processes of manufacture. S. W.

Determination of the Bran Constituents of Flour. Fr. Wiedman. *Z. Nahr.-Genussm.* 41, 236-7 (1921).—One gram of the well mixed flour sample is ground in a mortar with water and washed into a 100 cc. beaker; not more than 25 cc. of water is used. 25 cc. N NaOH solution is stirred in and then 25 cc. of saturated Bromine water added. The bran constituents now readily sink to

the bottom and after repeated centrifuging and washing with water the sediment is in excellent condition for microscopic examination. D. B. Dill.

Digestibility of Raw Rice, Arrowroot, Canna, Cassava, Taro, Tree-fern, and Potato Starches. C. F. Langworthy and H. J. Deuel, Jr. *J. Biol. Chem.* 52, 251-61 (1922).—Each of the starches under consideration was eaten as the principal constituent of a frozen pudding, resembling ice cream in texture and flavor, of which the starch made up about 20%. Raw corn, wheat, cassava, rice and taro root starches were completely digested when eaten in amounts as large as 250 grams per day. Raw tree-fern and true arrowroot (*Maranta arundinacea*) starches were nearly completely digested but some starch was present in the feces (estimated digestibility 93.4 and 95.7% respectively). Raw canna starch was even less digestible, its efficiency being about 50%. There seemed to be a direct relationship between the size of the starch granules and its digestibility but it was not possible to determine whether this relationship was accidental or not. One might readily suppose that the larger starch granule contained a thicker cellulose covering and consequently one more impervious to the digestive ferments than the smaller granule. The factor of surface area might also come into consideration since the larger the granule, the proportionately smaller area for being attacked. There are also indications that smaller quantities of a given starch might be more completely digested but additional experiments are necessary to prove this conclusively.

A. P. Lothrop.

Self-Rising Flour—What Is It? B. R. Jacobs. *Am. Food J.* 7, No. 5, 9-11 (1922).—More than 25% of 37 samples of self-rising flour purchased on the market in the South were of inferior grade; only one contained as high as 11% gluten. Excess of phosphate or NaHCO_3 was found in many samples. Regulation in the manufacture of self-rising flour is necessary as a health measure. Adoption of standards of purity for flour and leavening ingredients with limits in quantity of latter is recommended.

H. A. Lepper.

The Nutritional Requirements of Baby Chicks. II. Further Study of Leg Weakness in Chickens. E. B. Hart, J. G. Halpin and H. Steenbock, with the co-operation of O. N.

Johnson and A. Black. *J. Biol. Chem.* 52, 379-86 (1922).—Baby chicks were reared to a weight of 800 grams or more (11 weeks) on a diet of white corn, skimmed milk, NaCl , CaCO_3 and cod-liver oil, with a litter of shavings. When the cod-liver oil was omitted, the animals died in from 4 to 6 weeks, developing "leg weakness" and showing a low inorganic P in the blood serum.

I. Greenwald.

Patents Granted

Bread Making. Campbell Baking Co. *Brit.* 177, 783, March 28, 1922. The keeping qualities of bread are increased by adding a non-toxic peroxide to the dough batch, which is thus able to absorb more moisture than ordinarily. The amount of peroxide added is small to avoid breaking-down of the gluten. Suitable proportion of H, Ca, Mg, Na and K peroxides are stated. The peroxide is generally introduced in powder form at the dough stage of the sponge, but it may be previously mixed with any of the dough constituents. H_2O_2 is introduced with the H_2O .

Bread-making. R. Graham. *Brit.* 176, 752, Oct. 12, 1921. Soy bean flour is used in making bread, the unpleasant characteristics being removed by baking a dough of soy-bean flour and bread materials with starch-decomposing and more especially diastatic additions. The enzymatic auxiliary substances may be added during the crushing of the beans or when the dough is being prepared, use being made, e. g., of bran, malted grain, diastatic malt extract or the suspension derived from flour of malted materials treated with warm or cold water and allowed to stand for several hours in a cool room. Owing to the acid reaction of the crushed bean, the flour is desirably neutralized, before mixing it with the enzymatic auxiliary substances, with an alkali such as 1.5% of NaHCO_3 . The soy-bean flour may be formed into an emulsion by dissolving it in weakly alkaline boiling water, the emulsion being, if desired, freed from dissolved particles and mixed with the other ingredients. The dark brown bread produced is stated to resemble, according to the selection of materials, ginger bread, or ordinary rye bread, and it has long keeping qualities and is easily digestible. Examples of suitable proportions of the various ingredients are given.

From Harried Bakers

Questions in Our Daily Mail Show What Matters Most Puzzle the Alert Shop Manager

IF YOU were not sure you were baking the best possible loaf of bread and wanted your loaves looked over by experts, would you send whole loaves or only a few slices to the American Institute of Baking?

Down in Texas a baker who was in the right church but the wrong pew, thought that a few slices would do. We wired back for whole loaves and hope to bring his bread along to the best form it is capable of taking.

It is really astonishing to see the great improvement in bread after it has been submitted to examination by the Institute's chemists and suggested improvements in method have been made. This service, including a special and continuous bread scoring service, is open to all members of the American Bakers Association.

"Is it practicable to change the amount of yeast in bread doughs from day to day to conform to relative yeast strength or activity?" writes in one baker. We had to inform him he was asking a question for our Research Department, not the department that deals with knowledge already worked out and proven.

The Research Department, it happens, is working hard to develop such a test. Similarly we tested last month the machine that divides shortenings into much finer particles than formerly was possible. We reported the results—any baker who wants to talk with a salesman on the subject of this machine knows now what chemists working for him—for the Industry alone—have proved it will do. The guess work and the taking of the salesman on faith have now been eliminated.

"Does a humidifier in a dough room pay?" asked this same baker. Our reply was that certainly it paid, and we recommended that the baker employ one. We were able to submit records from many large bakeries showing that humidifying machines pay. As to the type to use we were able to send him the names of well tested makes both for large and small bakeries.

We were able to refer him to bakeries near his own plant where he could find both the large and the small type of humidifier in operation.

"Is the method of determining dough viscosity recently brought out by Dr. Gortner and by Dr. Bailey of practical usefulness?" was one question put to our chemists.

"Yes," went back the answer, "the Gortner-Bailey method has been of considerable value in determining the difference in the viscosity of strong and weak flours and we believe that at the present time one of the large milling companies of the Northwest is using their method with the MacMichael viscosimeter in testing flour."

And so the stream of questions keeps pouring in. One baker sent in a loaf of bread Dec. 4. It astonished all who examined it as it showed a trace of rope. Rope in winter is almost unknown. The baker was informed that some portion of his shop must have been very hot and was advised to clean up thoroughly before the next spell of warm weather comes in. Troubles come to all of us and when they come your way remember that the services of the experts on your Institute staff are yours to use to your advantage.

BAKING TECHNOLOGY

*A Journal of
Applied Science
in Baking*



*Published by
The American Bakers
Association*

Vol. II

CHICAGO, ILLINOIS, FEBRUARY 15th, 1923

No. 2

The Great West Responds

BECAUSE members of the baking industry of the Great West realize now as they never did before that the only loaf of bread any American housewife should be allowed to buy is the Quality loaf, they turned out during January in fine mass meetings in every sizable town from Butte to San Diego to hear spokesmen for the American Bakers Association.

They heard the story of the American Institute and how it was created by the industry for the industry, to become a center through which bakers will always be kept abreast of the times, and always be informed of the

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latest scientific developments in every nutritional field.

As the bakers of the Great West responded to the story, they joined the Association, not in ones and twos, but in squads of tens and twenties from each community where for one reason or another they had failed heretofore to take step with their fellows in the industry.

One fine thing the representatives of the American Institute discovered at

every turn in the Far West. This was that the modern bakery had arrived there as completely as in any other part of the country. The shabby and the dirty bakers were seldom encountered and

when they were they were found to be on the down grade.

Public officials charged with the duty of enforcing pure food laws and sanitary laws, were glad to come to the mass meetings of bakers and pledge themselves in hopeful co-operation with the American Institute, to encourage every advance within the industry and to bring changes about through education rather than through harsh arrests.

Men from the universities, and women from groups interested in nutritional studies were glad to meet with the bakers and outline their hope for Quality bread that shall excel any bread the world has had yet for the family dinner table.

Ireland's Bread Work

In Los Angeles, was the heart of the January meetings of California bakers. Secretary William F. Ireland there staged, with the help of Mr. Van de Camp, president of the Southern California Association, and Ross Beamish, governor for California of the American Bakers Association, a bread week full of activities never before attempted on such a large scale

The meetings of this week included broadcasting talks from the most powerful wireless stations in the world. The newspapers, the Times and the Examiner, contributed these facilities. Also included were talks about the baking industry, newest born babe of Mrs. Machinery, before the Rotary Club, the Kiwanis, the Lions, the Arnama, the Los Angeles High Schools, the Electric Club and the Milk Dealers Association.

Electric Club Takes Hold

To each of these some special message was carried.

Dr. H. E. Barnard, for instance, ap-

peared before the Electric Club with a message of co-operation between the electric manufacturers and the bakers. He told how Dr. L. A. Rumsey, a research chemist at the American Institute, had been assigned the task of studying out all features connected with the possible increase in the use of toast for breakfast. He recalled that Dr. Rumsey brought in all the toasters on the American market—and found that hardly any of them would toast a standard slice of baker's bread. He illustrated the need for co-operation by telling the story of the manufacture of these toasters by good electricians who didn't know a thing about the baking industry or its needs.

Hot Point Men Interested

He suggested the vast increase that would occur in the use of electric current if every family had a toaster in the home, instead of the toaster "being made so expensive that it only figured as an occasional Christmas gift." He spoke of many varieties that toasted so slowly that breakfast would be over long before the toast was ready.

Among Dr. Barnard's hearers was the head of the Hot Point Electric Iron Manufacturing Company. Its plant was located near Los Angeles. The head of this company listened with great interest and when Dr. Barnard concluded he pledged that his company would put an electric toaster, to be fully approved by the American Institute, on the market at once and would push its sale with all the resources of his organization. He suggested also that he would manufacture it to sell at a great deal less than the present price for toasters.

Milk Men Interested

Milk men were interested listeners, along with electric current men and but-

ter men, to this talk of Dr. Barnard's. Current men pledged their co-operation with the "Toast for Breakfast" campaign as well as electric manufacturers.

Next day Dr. Barnard addressed a meeting of the milk dealers of Southwestern California. He brought out the possibilities of bread, milk and butter going together as a triumvirate giving a complete food ration to any consumer. He asked why the butter men foolishly advertised butter by the carton instead of lively pictures showing it being spread thickly upon slices of bread, by some attractive young miss. The butter men caught the idea. They pledged that in future the "butter carton" advertising would totally disappear in favor of joint advertising of bread and butter.

Milk Tags Next Year

For the next Bread Week demonstration the milk men pledged that they would tie tags to their milk bottles reading "Drink milk with bread. Together with butter they make a complete diet."

High Schools Alert

In the high schools, both the students and the parents who assembled in mass meetings at night were delighted with the story of the modern baking plant that they were permitted to hear. In the Hollywood High School a film was shown depicting modern bakeries at work. It was the Fleischmann Company film made by Dr. Lee of the Fleischmann company last summer primarily for use in connection with the September convention. When the children were told that it would take twenty thousand of them to make as much bread at home as one of the machines shown in operation could turn out in a day, they cheered for modern inventions and the modern baker. They "got the message" of what the modern baker

means, as they never had before, in "releasing mother from kitchen drudgery."

At Fresno

At Fresno the bakers assembled after a long period of mistrust that had held them apart and suspicious of one another. They found the experience so pleasant that they organized the San Joaquin Valley Association. They had the privilege there of learning how their fellow townsmen of the Sunmaid Raisin Co. had filled all American newspapers and the billboards of the whole country with "Eat Raisin Bread" advertising. They were told that this campaign cost the raisin folk over \$1,000,000 and while all this money was raised in Fresno alone, the most the American Bakers Association had for its entire national budget was \$70,000 raised by dues from some 500 bakers out of the 32,000 in America.

"I'll join" at once spoke up the largest baker in the valley and four of his associates "followed through," in short order.

The dues of \$25 per oven did not oppress or cause hesitation as had been the case last year when the dues were twice that sum.

In Santa Anna a meeting brought out a dozen bakers. In a little town of Escondido up in the mountains a full blooded Pima Indian was found at work on a dough bench, doing first class baking. He was an army man, who had learned baking in an Indian school. Coming from a most enlightened and peaceful, industrious tribe he found no difficulty in working steadily at his trade.

This was not the only Indian found closely connected with the bread industry. In the Columbia River gorge H. H. Haynes of the Haynes Foster Baking Co., was anxious to show the Institute visitor a real "live, wild Indian."

He told how the Indians had fishing rights along the Columbia which had never been relinquished so that one was sure to be about somewhere. At last one was encountered striding down the gorge where Chief Multnomah had once presided in all his power and glory.

This Indian was smoking a fat cigar, wore rubber hip boots, an army overcoat of very smart design—and in his hand he carried four loaves of wrapped bread. It was modernization of the savage with real “vengeance.”

In San Diego and Pomona the Bread Week was bound up with fine local conventions. Local associations remained behind as a creation of the tour of the Institute men in almost every town.

In the Northwest

Meanwhile, during the early weeks of the month, an Institute spokesman had met with the bakers of Montana, Oregon, and Washington. At Billings, the first meeting place, bakers had been reluctant to come in because of the icy roads. But at Butte there was a splendid turnout. The president of the Montana Association who was just opening a bakery in Butte, declared by long distance telephone that he believed in association and association work, and was against selling toy balloons and jackknives and dishes with bread, and the using of bread as a leader to attract other trade on which a fair profit for bread could be tacked while selling bread below cost.

His sentiments were cheered. Of the twenty bakers who assembled nearly all asked for pictures of the Institute building, for membership application blanks and for information about the School of Baking which is now self-supporting.

At Spokane

At Spokane David Ackerman, a large wholesaler, and E. I. Bradley, the city's

most beloved baker, who conducts a window bakery, both had interesting stories to tell. It seemed that when the bakers fell out with one another, Bradley was the John Hartley of that town. Everybody loved him and would come at his bidding when they would not for any other bidding.

Ackerman did not have to be told the benefits of the National association. He explained that years ago when he was a very small baker he learned to believe in the National. He learned to listen to speeches at the National convention. He learned also to talk with the bigger bakers who were members. From them he learned just what their idea of a modern bakery was. Then he proceeded to build such a bakery in Spokane. In addition to all other reasons for doing so he considered that such a bakery would prove to be “insurance” against the possibility that any big fellow would come to Spokane and find the field inviting. He not only had a modern plant but it was capable of picking up any increase in business that the growing community might make for years to come.

Help at Seattle

William E. Matthaei took charge of things in Seattle. He assembled there bakers from Tacoma and many inland towns, as well as a group of visitors from Portland. A young lady from the University of Washington gave the results of her vitamin researches and outlined her ideas of making a more nutritional loaf of bread. She in turn was informed by the visitor from the American Institute that the Institute had furnished whole-milk formulas to the industry that would cram a loaf as full of vitamins as possible, and had also furnished a milk-and-honey formula to add the vitamins of honey to those of yeast and milk. The

new vitamin loaf of the Ward Co. was discussed and many questions were asked as to how it was selling. They were informed that the university people could no longer assault the baking industry as this loaf had taken into account all discovered vitamin knowledge and had a record of sustaining the life of test animals through continuous generations, which was a thing no other food ever known in the world would do alone.

At Portland and Astoria

A fire which had swept away the business portion of Astoria had not daunted Portland bakers for one of them had hustled a house right down to Astoria on a boat from Portland and had stocked it with bread—the first house to arise on the town's ruins. Then this baker, H. H. Haynes of the Haynes Foster Baking Co., had operated a free soup kitchen for a week while the town found itself and started over.

Mr. Haynes was on hand as organizer of a dinner greeting at the Frey Hotel. At this dinner members of the Allied Trades were informed of the way the American Institute proposed to help them sell more material to bakers by increasing the output of bakeries and popularizing the baker's products. They were told that Baking Technology sought to be a broadcasting station for the industry as a whole but that it could never broadcast its message until the bakers had on receiving sets—and the allied tradesmen also. More than a score of allied tradesmen subscribed to Baking Technology in order to keep up on the latest scientific developments and organization news within the industry.

Mr. Haynes led off with a membership application for his plant. At the Log Cabin Baking Co., a dance and social evening permitted all plant employees to

mingle socially. At Astoria the Chamber of Commerce met at the call of Mr. Haynes to hear the story of bread, and its role in modern life and the story of the young industry that is growing up on the back of the world's oldest and most useful handiwork. This same story again was repeated at Trail's End, the historic spot where Lewis and Clark brought to an end their long trek to the Pacific Ocean in 1805. Here Mr. Haynes had opened a branch bakery "to grow up with the new town."

San Francisco Responds

San Francisco had always been a "place of mystery" to the American Association. There were rumors that San Franciscans had "native sonism" and wanted "to go it alone." All these rumors proved false. They joined in force as soon as they had contact with the plans and purposes and achievements of the American Institute and the American Association.

It was found here that high taxes were pushing some bakeries over from the black side of the ledger to the red. One bakery was sledge-hammering its ovens to rebuild out in a lower tax area. Here was a condition to watch and report to the National tax authorities. How many other bakers are being high-taxed into trouble?

In the Mountains

At Sacramento, Salt Lake, Colorado Springs and Denver, bakers turned out in force and joined the American Association in force after hearing Dr. Barnard.

The high peaks of the Rockies looked down on these meetings—from the east upon the meeting at Salt Lake, from the west at the meetings in Colorado. Mr. Bode, secretary of the Royal Bakery at Salt Lake, explained the working of some

new machinery to help the small baker compete, through cost reduction, with the bigger bakery who can afford the standard size machine equipment. Special articles were promised on these small-sized machines for Baking Technology.

A story was told about bread at Colorado Springs. It concerned James, discoverer of James Peak, near Denver. While this old Pioneer was out on the trail he lived for many months without bread. But he accumulated a hunger for it the grizzly bear, the antelope, the elk, the deer and the trout would not appease. At last he encountered a trapper named Chouteau in camp and was treated to a baking of bread. James ate it all—every crumb he could get the trapper to give him and still he was hungry for more. It was suggested that if the Romance of the Far West were written up in the terms of the trappers and traders who first went out there to open the trails,—and the hunger for bread that accompanied them, there would be romance here equal to that of gun and tomahawk in which terms Western Romances mostly had been done.

A final conference between Dr. Barnard and flour dealers in Kansas City, looking to the greater usefulness of the American Institute in cases involving bakers and millers, ended the Far Western journey. It was one of the most useful ever undertaken to spread the gospel of our growing and marshaling industry.

A Canadian Speaks

THIS letter is prompted by the fact that I have just been fortunate enough to get hold of a copy of your journal "Baking Technology," and I must confess that, in the words of your poet laureate, Ring Lardner, "it has knocked me for a goal."

I find it contains just the substance I

have been looking for in vain, in other scientific journals and in the trade papers and I certainly think that the American Bakers ought to feel proud at having secured and at being able to retain, the services of such an energetic and competent staff for their Institute. They also should feel further fortunate in having as head of this Institute one who is so keenly appreciative of its requirements and has so evidently the outstanding ability for directing research.

I am particularly anxious to know if the Journal is published exclusively for members and if not, under what conditions I might be included on the mailing list. I should like very much to become a subscriber and if possible, to receive copies of the bulletins which, I gather, you occasionally issue. I am still engaged in the same type of work so you can understand that the information which they contain would be of immense value.

In conclusion let me assure you if at any time there is any information or any peculiar type of sample which you would like to obtain from this side of the line, I shall always be pleased to oblige you.

Every success to the Institute

R. Sneddon, Montreal, Quebec.

A Word from Fresno

I am thoroughly sold on the American Bakers Association. I know it is the only thing that will put the Baking Business where it belongs and I pledge you my word that when I get into the new plant and get things in order I will work to get all the rest of the bakers in the San Joaquin Valley to join with me in supporting the association. I know what we need in this valley and I will do my best to bring about a 100 per cent organization.

The Sunshine Baking Co.,

by Ed Morris.

The Retail Baker's Fears

*Of What Scientific Control May Mean for the Baking Industry
in Creating a Laboratory Demand*

THE "Retail Baker", a magazine owned by retail bakers to voice their needs, puts all retailers on guard against "so-called Model Bread Bills." It warns its people of a movement in America in favor of laws compelling bakers to install chemical laboratories and rightly sets forth that such laws would force upon retailers expenses they could not possibly meet. So that they would be forced out of business, in favor of wholesalers who, presumably, would foster such laws to undo the retailers.

At a time when the crying need of the American baking industry is Federation and Organization, what wholesaler wants to foster any such move to create new suspicions, and form new lines of cleavage?

The writer of this article well knows from conversations with hundreds of American bakers who are trying to build up organization so that the baking industry will match and meet other sister industries where Federation and cooperation are the living rule of the hour, that no such laws will be fostered anywhere within our organized groups.

Because we believe that all retailers should be guaranteed against the suspicion that any such proposed law will be fostered or countenanced by these headquarters we have addressed to the Retail Baker a communication setting forth the problem of getting all elements of the baking industry as nearly together as possible, as it is viewed here. Can anyone in the industry suggest other points of contact and other problems that can be wiped away to open the highway for real consolidation and cooperation?

The Editor, The Retail Baker, New York.

As you know the discovery of yeast by Louis Pasteur was the most important discovery in our modern world, and had more to do than any other one event with the healthfulness of modern cities. It led at once to the "pasteurizing" of wine and beer to keep them from souring, just as bread is kept from "souring" by baking the dough until the yeast cells are killed.

Modern medical practice with regard to the forty communicable diseases now known to be spread by micro-organisms such as the wild yeasts and molds of the air, all rests on Pasteur's discoveries. Brewers had to be great sanitarians to keep any "strain" of yeast pure in beer cultures. And they built up in Copenhagen the famous Sorenson laboratories which carried on from the point Pasteur left off.

They found, for instance, that hundreds of differently flavored wines depended on wild yeasts that lived about certain vineyards and settled on the grapes of those sections. They obtained these yeasts, bred them in separate containers, and developed wonderful wine flavors from their use. Just as other manipulators of wild yeasts and bacteria have obtained some 325 different varieties of cheese.

In America Max Henius carried on for the brewers just as Sorenson did at Jacobsen's Institute in Copenhagen. When the baking industry's members, in part, decided that American bakers needed a scientific home with laboratories and school, they found Max Henius waiting for them. Thus our Institute follows in direct line of descent from the Pasteur Institute at Paris.

Our Institute Visitors

Over 700 bakers, more than half of whom were retailers, visited this American Institute of Baking, last year. Many of them took notes of simple tests they could make in their own bakery to detect adulterated sugar, to find the moisture of flour, to determine whether a flour was a patent or a lower grade, etc. And many saw vivid lessons in the price bakers pay for damp storage of flour, and damp conditions in the bread room after baking.

The point of it all is this—that nowhere has it ever been preached or thought in the building up of this Institute that its researches and its laboratories would be available to one baker any more than another baker in all America. Our bulletins are complete to the last word we can find out. You can have them for the asking. They were on the counters here for any baker to pick up.

And the baking industry alone paid for their production—those who believe the day has come when every baker should be helped along to the best information about his industry he will take an interest in.

Now don't think any baker needs a chemical laboratory. Here is one here—and there are private ones in all cities—to which any retailer can come with any problem he has to work out. Members of the American Association can obtain service from our laboratories up to any reasonable amount.

Many of them now in small cities send in their fuel, their shortenings, their flour—to see if they are getting things as labeled.

Only a few weeks ago we had a retail baker from Wisconsin in here with streaky bread. We worked with him, eliminating factor after factor until we were down to one of the flours he had used in

a blend. Then it was found the mill was not sending him what he ordered. **THAT WAS OUR SERVICE IN ITS IDEAL FORM.**

Our Loyal Supporters

Headquarters has to thank only 500-odd bakers instead of 20,000 for the chance that enabled the Industry to create such a National home, I know many bakers who opposed it, wanting service only to a selected group of a hundred or so who would pay high for it. I know at least two groups of less than 100 bakers each who are seeking to duplicate all our activities for their own private benefit alone. Of course they hope bakers as a whole split apart in discordant factions.

I write you in full belief that it is the small baker and not the large baker who needs the American Institute and that the Institute will come into its own only when this is fully known and realized. I know that some bakers want Baking Technology abolished as a magazine of general circulation—and restricted to confidential bulletins to a select few.

Dues Going Down

The dues have been reduced, **KNOCKED SQUARELY IN HALF.** And they will be knocked down still lower as fast as new members run a total annual budget up beyond the fundamental needs of a National headquarters. These needs are now placed at \$70,000. And this when raisin growers with their little red packets that are offered in lieu of a sandwich, find organization has worked so well that they are spending \$2,500,000 this year in advertising their sandwich-substitutes alone—the 5-cent raisin packets.

The National association in Bakerydom seems to have grown up when there were no strong state or local associations. Now strong state associations and strong local

associations give new factors to work with.

The National changes to meet this day. New England, retailers and wholesalers alike, land two men on the American Association Board of Governors whom New England selected—not anybody else. They were recommended in a fine New England convention. At Bedford Springs, by popular vote, Pennsylvania gives us her energetic president to build nationally as he has built for his state.

The Sanitary Code is now merely “declaratory” and is held up as an ideal towards which an inquiring baker can find it desirable to go, as far as he likes and desires. And no coercion or punishment or force seeks to drive him further.

These are the gestures of the real leaders of the organizing American baking industry towards general consolidation.

Aren't they in the right direction? If they aren't pound away at us who are temporarily here at headquarters and I fully believe that the overwhelming need for a genuinely consolidated industry will force every obstacle out of the road. Nobody can revile retailers around these headquarters and remain in countenance, either visitor or staff worker.

Our hope is soon to have a general conference here of all Chicago bakers and to take up plans to advertise bread—just bakers bread—at the next Chicago Health Show which is coming along in our town. We can begin there to shape up a booth with the right display, and work one down that can be sent anywhere there is a show—as a Headquarters service of the not distant future which will work for ALL—each in his own neighborhood.

Just so we push forward at the Institute into fields still unknown.

Yours, with best wishes and congratulations on your sincere and outspoken service to your own clientele.

—The Editor of Baking Technology.

Magazines Wanted

The Library of the American Institute of baking is unable to complete its files of *Bakers' Weekly* and *Western Baker* for the reason that several of the numbers are missing, and the publishers are unable to supply them. The Library is being used for reference by many visitors, as well as by the members of the staff of the Institute and students. It is also open for research work to all who may wish to avail themselves of the opportunity, and Miss R. E. Priddat, the librarian, states that several guests have visited the library since the beginning of the year for this purpose. It is therefore of vital importance that the journals of the baking industry be on the shelves for ready reference, as these contain a priceless fund of information to be found in no other books. It would be very much appreciated if some reader of *Baking Technology* would look over his unbound copies of *Bakers' Weekly* and *Western Baker*, and send us the following:—No. 7, of Vol. 24 (1919) and No. 1 of Vol. 26 (1920) of *Bakers' Weekly*, and the January number of Vol. 16 (1921) of the *Western Baker*.

Single Track Minds

Apparently unelastic minds which will not stretch because no gluten is left in them are of little more use in the bakery than elsewhere.

“We have a number of bakers in our organization,” writes one large bakery proprietor, “who need very badly the baking course at your School of Baking, but they are so old and so stubborn that they cannot see its benefit. I have advised several of our younger men to go and take the course and I think I will get results.”

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

Published by the
AMERICAN INSTITUTE OF BAKING
1135 Fullerton Ave., Chicago

Entered in the post-office at Chicago, Illinois, as second-class matter, under the act of August 24, 1912.

Price, Fifty Cents a Number; Five Dollars a Year.

FEBRUARY 15, 1923

Halved—Will It Double?

Our National Convention halved the dues for 1923. Will halving the dues double the membership, and thus stimulate the spirit of share-and-share-alike in both burdens and benefits?

Lincoln, Washington and Our Little World

THE month of February will of course be linked always in the minds of Americans with Lincoln and Washington, the two greatest builders of American spirit. In building up the baking industry its greater leaders to-day face problems not unlike those of the most beloved leaders of our nation. They must trust and develop others—always a hard job. It is said that a state of peace is natural to man, but wars come so often that is easier to conceive that a state of peace is really a super imposition of a higher civilization.

In our ranks foolish wars break out too often to mar the work of those who should be marshaling their forces and marching together to gain dignity, recognition, and public confidence for the modern baking industry. Herein lies a lesson we all could take from Washington and Lincoln: neither ever tried to run down a helpless subordi-

nate or to make a heart rankle in pain that could be made to glow with love and pride. In the orders of Washington there is not a single one that is harsh, uncooperating, and in the tone of a final fiat that must be obeyed regardless of conditions facing its recipient. We know a baker who needs a production manager but has had an average of two a month flee from him for the year past. He tried coercively to force each one to do just as he would have done in the hired subordinate's place. Another baker, who knew enough to let his subordinates function, each in his own appointed field, has that town's business and a mighty fine name besides.

"Jim" Marshall Passes

EVERYWHERE that bakers talk of cooperation, there will be a conscious or an unconscious thought of "Jim" Marshall. Marshall tried to do a task that will be much easier in the years to come. It was to bring together on the Municipal Pier, Chicago, an entertainment during the Bakery Equipment Manufacturers Association's Exposition that would bring cheer and happiness to all who might attend.

But at every turn he encountered doubts and jealousies, and the smouldering fires of old resentments that will have to die out before cooperation really comes into full flower in our industry. Against obstacles both of personnel and conditions Marshall flung himself with all the energies and good will he possessed. He came "smilin' through" to the end. But the end was physical exhaustion, in which condition he was not alone in terminating his contacts with committeemen and committee labors.

He served life and his associates with a will. He never knew a well day after his experience at the Chicago Pier. Yet because of his labor much good will exists in our industry that was not there before.

Certain mountains were passed over that will never have to be crossed again on the Trail of Expanding Bakerydom. "Jim" fell as a casualty on the Field of Service. Everywhere he will be missed, and the good he did will live for a long time after him.

The Van de Kamp Way

BLESSED and thrice alive is the baker who adapts his methods to the environment right around him. In Los Angeles the air is clear and fine for the smoke nuisance has not yet become a blight in the heavens. Folks who come there to winter have been converted to bakers' bread in other communities. For them Mr. Van de Kamp bakes a Quality Loaf, seldom excelled the country over. It is a whole milk loaf of fine texture and inviting color. To market it Mr. Van de Kamp drew unto his heart the movie kings of Hollywood. He had one of their studio experts manufacture a little Dutch windmill for him, with alluring vanes, and a fine interior. Inside the mill Van de Kamp installed two lovely Dutch girls, in National costume, to meet the oncoming customers.

To the women of Hollywood buying their cakes and bread in such a place suggested Alice in Wonderland. They came in great numbers. Van de Kamp built one mill after another on the model of the first and he placed them in all low-rent areas. No mean wintertime takes wicked advantage of these beauty spots of Los Angeles. And one of their economies is that if rents exceed sales values in any district he can set his tiny house on skids and haul it away to some more favored spot. He had a movie man build the model mill and not an architect "because a movie man sees the picture—an architect would be more likely to make a building."

Not so long ago Van de Kamp launched

his idea with only \$200 between himself and the Sheriff. Now he still calls himself a "retailer" but he is a much loved and a very busy member of a fine American community.

George Haffner's Gift

IN his quiet way in Fort Wayne, George Haffner has lived a life of love and service. Bakers in that town never grew so mutually suspicious of one another that they wouldn't come to a meeting when Haffner sounded a call.

He was perhaps in the field as early as anyone else as an advocate of Scientific Baking. His curiosity to know what went on in the mixing machine and the dough trough was insatiable. It led to his attending conventions far and wide even before the National was organized. With a true vision that work was needed to be done here in a more than spasmodic manner, he has helped the National weather every storm. His loyal and helpful letter have been a source of inspiration and encouragement to all at Headquarters, especially when storms have swept the face of our horizon.

Now this genial believer in a National organization sends us an invaluable gift of books. It consists of twenty bound volumes of Bakers' Helper. During the years these magazines appeared, H. R. Clissold, publisher and editor, was one of the commanding advocates of National organization. He served through some of these years as the first Secretary of the National association. We wish we had his memoirs as the National's Secretary to go with these bound volumes of his editorial work. To have the honor of becoming a final repository for such fine factors of the Literature of Bread as these twenty volumes of Bakers' Helper is one of the things that makes it interesting to help build up an American Institute.

New Research Fellowships

Two Are Established at the American Institute by Merrell-Soule and the Sunmaid Raisin Companies

WHAT is the finest form in which to include raisins in a loaf of bread?

Shall bakers meet the cry for a loaf richer in vitamins by making a milk loaf in larger and larger quantity?

Shall bakers use these two specialty loaves to offset a growing hope on the part of certain specialty manufacturers that bakers will sleep on their oars, contented with the standard loaf of white bread, while these specialty men slip in with all of their new fashioned products to harvest the change in public demand?

Here is a field for continuous watchfulness on the part of American Bakers Association. Also a field for continued research so that the soundest possible advice can be furnished to the baking world.

The Raisin Fellowship

As a token of the New Cooperation, in which industries touch hands that used to be far apart, the Sunmaid Raisin growers of Fresno, California, have established a \$5,000 fellowship fund for research in the American Institute of Baking.

This fund is to be spent finding out all it is possible to find out by laboratory research about the use of raisins in bread. How much may be found out by intensive study Dr. L. A. Rumsey learned, almost with a shock to himself and the rest of the Institute staff, when he began researches into the problem of toast's use for breakfast.

As soon as the commercial toasters were assembled it was found that while all had been manufactured by good elec-

trical engineers none had been made with much comprehension of bakery products. It was necessary to redevise practically all models to make them efficient servants of the modern bakery. And this has been done.

Now comes the problem of raisins in the bakery. Here, for instance, are the problems about raisins to be worked out:

1. Types of raisins, their storage in the bake shop, and preservation from molds, bacteria, and insect infection.
2. Study of raisin bread formulas with special reference to amount required of seedless and seeded raisins.
3. Methods of incorporation into the dough and mixing methods best adapted to insuring uniform distribution.
4. Fermentation of raisin doughs, relation to Carbohydrate content, yeast nutrition, and maturity of doughs.
5. Handling of raisin doughs, sponges and straights.
6. Influence on other ingredients of addition of raisins.
7. Influence of mechanical handling,—dividing, rounding, molding, on raisin doughs.
8. Proofing conditions to obtain best results with raisin doughs.
9. Baking conditions, oven, temperature, use of steam.
10. Cooling, wrapping and protection of raisin bread.
11. Food value of raisin bread, with special reference to relations with Composition and Economy.

This work will occupy the time of a research chemist for approximately one year. Results will be published on each phase of

the problem as rapidly as they are developed. The plan will be to give the baker all information possible to enable him to improve the quality of his raisin loaf.

The Milk Fellowship

Similarly the milk fellowship will enable a chemist to take up every phase of the matter of the nutritional value added by milk to a modern loaf, and the storage, handling, and care of milk products in the bakery.

This fellowship followed the visit of Robert G. Soule to the American Institute, just as the fellowship of the Sun-maid Raisin Co., followed the visit to the Institute of General Manager Hill of the Chicago office of the Sunmaid Raisin Co. and the visit to Fresno of Dr. H. E. Barnard, director of the Institute.

Where to Hunt Business

WHEN are the bakers of America going to learn in full the lesson so recently learned by the tobacco men, the raisin growers, the orange growers, the egg producers, the milk producers, and other great foodstuffs industries?

Here are the tobacco men, for instance. They formerly sold five billion cigarettes a year and thought it good business. Instead of fighting further for this business they united to promote cigarette smoking—a most non-essential habit. Yet they were able in the five war years to boost consumption from five billion cigarettes per year to fifty-five billion and are now pushing the total up to sixty billion.

Here is an interesting letter from D. P. Young, secretary of the Southern Illinois Bakers Association, to President William H. Korn. Mr. Young surely has "spotted" the essential bakers problems. He says:

"If I were to go into every phase of

the baking industry that needs attention I would have to send this letter by freight. The baking industry needs, more than anything else, closer co-operation, organization, and still more organization. With this accomplished most other matters would be automatically solved.

"Price wars and price cutting below costs, to whip some rival, would be a thing of the past. When the bakers QUIT TRYING TO GET THE OTHER FELLOW'S BUSINESS away from him, and when all their efforts are put into the effort to make quality bread at a fair price with the end in view of putting their bread into the homes where home-made bread is now consumed, then their business will increase,—not at the expense of their fellow bakers, but as their share of the general increase in business that is bound to come.

"One thing that I would call to your attention is the matter of taking up stale bread. This is the most ridiculous proposition that can be imagined. The retail grocer must laugh once every time he puts this over on the baker. In no other line of perishables that the grocer handles does he have the privilege of returning of unsold merchandise. We are trying to fight this in Southern Illinois. There should be a law against it and it looks as if one might be passed.

"I will close with the following general suggestions for the good of the craft: **Quality, Fairness, Organization, Co-operation.** But co-operation while last is by no means least."

There is no question but what "Baking Technology" is "getting better and better every day," and I really believe there is need for this paper in every bakeshop in the country. I only wish there was some way that I could suggest whereby it would reach every baker.

—C. H. Van Cleef, Secy., Allied Trades of the Baking Industry.

More Good Bread Per Person

How the Northwestern Miller Visioned the Work of Cooperation That Will Stimulate Its Greater Use

ROBERT E. STERLING, assistant editor of the Northwestern Miller, looked far ahead of present day conditions in the baking industry in a little article that appeared in the "Northwestern Miller." It "started something." It proposed a slogan: "Bread is the Best and Cheapest Food." And it also proposed that it be used so continuously and consecutively that its message could not be escaped.

Almost immediately flour men took up the idea. They promised to put the slogan in black letters on all their sacks of flour.

Also M. Lee Marshall, of the Ward-Campbell organization took the idea up. He proposed the slogan for every loaf of bread—to be printed on the wrapper. Many other bakers have written us for copies of this effective article. Herewith we reprint it in full.

Through special arrangement with its author, The Northwestern Miller is enabled to give advance publication to the following extract from "The History of American Milling and Baking," to be written and printed in 1932:

Much of the present large consumption of bread, with resulting activity of bread, with resulting activity and prosperity in both milling and baking industries, is due to a movement which had its inception in 1922. For a decade prior to that epochal year, the public taste had shown a tendency to turn to the eating of a greater variety of foods, many of them much more expensive and, from the standpoint of both absolute and relative cost, less

nourishing. To an indeterminate degree this change in the public taste was influenced by pseudo-scientific attacks on the food value and healthfulness of white flour and its products. These were so extensive, and carried such an appeal to people always disposed to study their digestive tracts and experiment with anything novel in eatables, that many who were themselves consumers of white bread felt in their hearts that something else would be better for their stomachs.

Millers and Bakers

From time to time, both millers and bakers had discussed the possibility of overcoming this belief through national publicity campaigns in the interest of white flour and its products. The subject had the advantage of being ready to hand to fill in the forenoon session at trade conventions, and speakers were the more willing to present it because loud and frequent applause was assured. The oratory, however enjoyable, never was fruitful in providing any funds for the conduct of such a campaign. Its altruistic beauty was widely and most satisfactorily recognized, and members of the industry derived much pleasure from the contemplation of what might be done.

Finally, as the result of an exceptionally careful and painstaking survey of the whole problem by a special committee of the Millers' National Federation under leadership of Mr. Breaux, millers of the country were asked to express themselves definitely as to whether or not they were prepared to participate in a national publicity programme to be conducted at an

estimated cost of a million dollars a year. To a greater degree than ever before in its history, the industry presented a united front and voted with practical unanimity. With almost no exception its members admired the plan very much, but were not disposed to take any part in the payment of the bill.

Letting the Public Know

On its face, this decision of the trade body seemed to set aside for all time any possibility of anything ever being done to emphasize to the public the high food value and low cost of bread. There remained, however, a few enthusiastic souls who adhered to their faith that somewhere and somehow the thing could be done. A small number of these, among millers and bakers, began in a wholly individual way to employ in their advertising and in various places where it would reach the public the line, "Bread Is the Best and Cheapest Food." The phrase was not in itself a new one, having long had a certain amount of trade currency. To a considerable extent it had, unfortunately, been displaced by another slogan of the period, "Eat More Bread." This latter phrase seemed, indeed, to comply with all of the professional advertising rules of direct command, but in actual operation it failed.

This was probably due to the circumstances that one of the popular movements of the time was to tell the people to "eat more" of something. There were numerous "eat more" weeks, in the seven days of which all persons were expected to respond to the demand, disseminated through newspapers and other advertising mediums, that they consume specified food product exclusively, or as nearly exclusively as they could stand it. The frequency of "eat more" commands had resulted finally in the public declaring

itself utterly fed up on "eat mores," and it is not at all sure that some "eat more" campaigns did not, just before the abandonment of the fad, prove boomerangs for the ambitious industries and cause consumption of their "eat more" products to decline.

No similar public resentment was created by the phrase, "Bread Is the Best and Cheapest Food." It had the virtue, not admitted by advertising experts, of not commanding anybody to do anything. No one had to clip a coupon to be mailed in, no one had to hurry, no one had to respond by doing anything whatever. The phrase merely stated a simple and quite indisputable truth, and let it go at that. Because of its soliciting nothing, the growing frequency of its appearance did not, as in the case of some advertising lines, become obtrusive or annoying. Another point in its favor was that its initial users sedulously avoided calling it a "slogan."

Immune to Attack

Most potent of all of the factors which early brought it into public favor was the fact that the truth so simply stated was immune to attack. Whatever might be said in behalf of any other food product, none could claim actually to rival bread as a fundamental food, none could claim superiority or contest the right to use the word "best"; much less could it be challenged in its claim of relative cheapness. Curiously enough, the phrase possessed a quality not in the beginning recognized by those who undertook to give it currency. Accent could be placed upon any word of the sentence in turn, and by each of the seven readings the truth of the statement was enforced anew. Such tests can be borne only by such time-tried phrases as "Virtue is its own

reward," and "Be good and you will be happy."

As the response of the public to the simple appeal of the sentence became more and more apparent, a steadily increasing number of milling, baking and allied enterprises adopted its use. Trade associations in both industries began to take an active interest in the campaign, and, through them, efforts were made to press every miller and every baker into the service. At first the response was somewhat sluggish, members of both industries having had so many nostrums recommended to them from time to time that they had lost faith in harmony of effort, and had undertaken each for himself, a career based on getting his share, or more, regardless of whatever else might come about. Anything at variance with this selfishly practical programme had long been cheerfully damned by all as being attractively altruistic but, in its application to business success, no more practically useful than a rainbow.

Despite these well-established and thoroughly justified doubts, the use of the phrase spread. Within a half dozen months following the first pioneer efforts, a majority of sacks of flour distributed in the family trade bore, either as face print or back print, attached to the package or concealed with it, the line, "Bread Is the Best and Cheapest Food." By far the greater number of flour advertisements, in newspapers and magazines, on placards and billboards, in printed text, on painted sign, and even on the caps, aprons, pie lifters and jimcracks distributed to "consumer trade" by millers, bore somewhere the line, "Bread Is the Best and Cheapest Food." Even the side walls of flour mills displayed the phrase in impressive letters, and the miller who failed to fly the flag wherever it would

catch the public eye was regarded as in some sense a slacker.

Flour Men's Co-operation

To an even greater degree did the baking industry give currency to the phrase. Every well-known brand of bread adopted the use of the line in supplement to its advertising. Sometimes it appeared in small letters, sometimes in great, but rarely did a bread advertisement appear without carrying the simple truth about bread. As the movement spread among bakers, the use of the phrase "Bread Is the Best and Cheapest Food" came to be of such general use as a part of the printing on the bread wrapper that manufacturers of paper wrapping had to be particularly instructed to leave it off by those few bakers who persisted in being blind and stubborn. Practically every bakery in the country had the phrase painted on its windows, and retail bakers displayed it placarded about their stores. In every city in the country the white and yellow and red wagons and trucks of bakers carried the line painted on their sides, and every bread box and shipping basket invited the eye with the sign, "Bread Is the Best and Cheapest Food."

Advertising Power

To the astonishment of the whole body of both interested industries, it was discovered that the advertising power available many times exceeded the total of all the bought and paid for publicity expended in the interest of widely advertised names and phrases.

"Eventually," "Kodak," "57 Varieties," "It Floats," and a score of other advertising lines given currency by the expenditure of untold millions of dollars over many years were forced into secondary place in the public mind. Even "Ford," backed by a billion of money

and proclaimed by the myriad metallic voices of the thing itself, came to be less frequently mentioned than the ever present, inescapable, yet unobtrusive, line, "Bread is the Best and Cheapest Food."

Increased Consumption

The exact effect upon bread consumption by the overwhelming currency thus given to this simply truthful statement could never, of course, be accurately measured. Trade and economic authorities of the time announced a scientific formula to the effect that increase in the consumption of any food could be gained only at the expense of some other food. What truth there was in this could not be determined, or, if determined, disputed. The simple fact remained that the consumption of bread in the United States, previously the lowest among all civilized peoples under normal peace conditions, began to gain.

Some food experts accounted for this in part by a natural change in public taste, which they held to move in cycles. Others, less expert but more practical, thought some of the change due to varying degrees of national prosperity, rates of wages and similar factors usually discussed in the appendices of tomes on economics. Somewhere between the two theories lay the truth, obvious to millers and bakers, that the dinner pail, whether full or half full, contained more bread than anything else. Bread, from its position in the food depths as a food accompaniment or carrier, claimed position as a food in and of itself, and the best and cheapest food of all, the most nourishing, most palatable and the least expensive.

More Bushels per Person

Thus, by education through reiteration of a simple truth was the American basis of wheat bread consumption raised from

a bare five bushels per person to the present standard of nearly seven bushels, actually on a par with the peace-time standard of the bread eating peoples of Europe. Very wisely, millers and bakers and all of the industries associated with them in promoting bread consumption never thereafter abandoned use of the phrase which had proved so potent in their interest. From that time forward to the present day, no point of contact with the public has been neglected in giving continued currency to the now famous line, "Bread Is the Best and Cheapest Food."

As an advertising accomplishment, just as there were doubters then, there remain questioners today. Wise men learned in advertising declared it could not be done, and even now stubbornly insist it has not been done, much as there are those who claim the earth is flat. In the history of publicity, however, the concentrated effort of American millers and bakers stands an unrivaled accomplishment, an advertising classic, the sum and aim and model for every campaign now undertaken, or, probably, to be undertaken within this generation.

Yet, considered in retrospect, its power and its success lay in nothing but the endless repetition of a simple truth, known to be the truth since the beginning of civilization; a truth constantly found in the Scriptures, which might have been stated by Ptolemy or by Julius Caesar or immortalized in Shakespeare. Success resulted, as it so often does in commerce and business, from the use of the simplest means to gain the end sought. "Bread Is the Best and Cheapest Food," considered as a truth, was never denied. It needed only reiteration to turn it from passive to active truth, and then to express itself in the increased use of bread, the best and cheapest food.

Oils for Baking Machinery

How Each Machine Calls for a Special Variety of Lubricant in Operation to Obtain Optimum Results

By ALLEN F. BREWER

Noted Engineering Authority, in charge of Lubrication Experiments for the Texaco Company

IN MANY industries today the purity or quality of the products depend to a marked extent upon the manner of lubrication and the grades of lubricants in use. Careless or sloppy application of the latter, or the use of inferior grades may frequently cause the ruination of otherwise perfect products due to spilling or dripping of the oil thereupon, as is the case in the textile mill. In no industry, however, does this concern us more vitally than in baking. The modern bakery, to successfully compete with the trade, must practically guarantee that its products are of the highest purity.

The development of baking machinery, whereby mechanical processes have supplanted manual labor in the modern bakery to a great extent, is most interesting. Only through such machinery is it possible today for our bread supply to meet the enormous demand. From the time the flour is received in the shop till the finished loaf of bread is ready for sale, practically all handling and every intermediate process is performed mechanically. Just as machinery has influenced the development of the flour milling industry, so has the allied trade of baking been developed for the same reason.

Flour Handling Equipment

However thoroughly the flour may have been sifted and bolted in the mill, it should, nevertheless, undergo a secondary treatment in the bakery to remove lint bag shreds, or other impurities that may have gained access during packing, trans-

sit and handling. Therefore, it is passed through what is known as the cone sifter, or a bolting reel, or both. In general, the treatment that flour thus receives directly prior to becoming a part of the dough is: cleansing by sifting, blending to thoroughly mix the various grades that may be used, conveying to storage bins, and bolting.

As a general rule, shafting and other wearing parts in flour handling equipment are built with special wood bearings requiring no lubrication. Where construction is otherwise, however, especially on internal bearings, they should be so designed that no lubricant can flow therefrom to contaminate the flour. On such apparatus the lubricant to use should be a medium viscosity oil of about 300" Saybolt at 100° F., or else a light-bodied compression cup grease. On such gears and chains that may be installed for elevator drive purposes, a pure mineral gear lubricant of 1000" Saybolt viscosity at 210° F. will be found satisfactory.

The Mixer

In the modern mixer lubrication will depend on constructional details. The larger machines are practically all of gear or silent chain drive, using electric power. Such mechanism is usually enclosed, as a safety factor, as well as to maintain freedom from dust, etc. Gearing is best lubricated by a pure petroleum product of a viscosity around 1,000" Saybolt at 210° F. It must possess excellent adhesive properties and not drip or be thrown off by

centrifugal force. Hot application of this lubricant should be made by use of a brush.

Chain lubrication can be efficiently performed by use of a similar though lighter product, having a viscosity of about 200" Saybolt at 210° F. In many cases, however, operators prefer to use a medium engine oil of 300" viscosity at 100° F., feeding by means of a sight feed oil cup.

For lubrication of bearings the chain or ring oiling system is prevalent and preferable, being far superior to grease cups. The latter will always involve the possibility of careless attention and subsequent damage to the bearings. The chain or ring oiler is positive in action and requires refilling of the reservoir only about every week or two, with complete cleaning about every three months. Its operation can always be observed from the top bearing oil hole, and maximum economy in oil consumption is obtained. Such bearings are subject to high pressure and require a fairly heavy, pure mineral engine oil of 300 to 500" Saybolt viscosity at 100° F. When provisions are made for grease lubrication by means of compression grease cups, a good light-bodied cup grease will meet requirements. On motor bearings, which are practically always ring or chain oiled, the 300 viscosity engine oil is most advisable. Suitable stuffing box arrangement on the mixing arm shaft will prevent all possibility of oil entering through the main bearing to contaminate the dough.

If roller bearing construction is installed (as is the case on certain machines) a pure petroleum product of petrolatum nature, or a light-bodied compression cup grease will be suitable. Customary recommendations are to lubricate such bearings every six months.

Dividers

It is claimed by authorities that the modern divider is probably the most difficult machine to lubricate in the baking industry. Unless this be carried out most carefully, considerable power losses will result from too little lubrication, or oily bread from excessive usage. On all parts of the cutting mechanism, such as knife edge, plungers and back of the division box where there is possibility of the dough coming in actual contact with the lubricant, only the highest grades should be used, such as lard, cottonseed oil, lard compound or petrolatum or a non-tasting, colorless, pure mineral oil. No oil should be selected that has a tendency to turn rancid, gum, or react with sugar to affect the taste of the bread. For this reason petrolatum or a tasteless, pure mineral oil is considered as the more suitable.

Other working parts, such as bearings which are usually solid throughout with the exception of a roller bearing on the high speed motor shaft, can be well lubricated by an engine oil of about 300" Saybolt viscosity at 100° F. Gears, chains or cam surfaces, require a heavier lubricant of petroleum nature, having a viscosity of about 1,000" Saybolt at 210° F.

The Rounder

Rounder lubrication involves motor bearings, reduction gears, and spindle bearings. The first two points have been discussed under mixers, with recommendations as to suitable lubricants. Where worm reduction gearing is used, operating the gears in a bath of oil is generally best practice, using a pure petroleum lubricant of about 120" Saybolt viscosity. Concerning spindle and other bearings: where ball or roller bearings are installed a good grade of petrolatum or a light bodied compression cup grease is the best lubri-

cant. On other straight bearings the use of a pure mineral engine oil of about 300" Saybolt viscosity at 100° F. applied by sight feed oil cups will be suitable. Certain smaller sleeve bearings may require lubrication by means of grease cups, wherein a light-bodied compression cup grease should be used.

The Proofer

There is no extensive lubrication necessary in the modern proofer. Pan-proofers normally require none. Only the automatic preliminary proofers concern us, and as these are usually built with wooden bearings for all conveyor rolls, only the motor bearings, the metallic bearings of the spacer and main driving mechanism, and reduction gearing, require lubrication.

Lubrication of motor bearings and gears has been discussed above. The other bearings are usually fitted for grease lubrication. On such service a light-bodied compression cup grease is suitable. Certain types of automatic proofers are equipped with roller or ball bearings on the main and auxiliary driving shafts. Lubrication in such instances is best attained by use of a pure grade of petrolatum or a light-bodied grease. Ball bearings are also used to some extent on revolving shelf proofers. Here as well, petrolatum or a light-bodied compression cup grease is the proper lubricant.

The Moulder

Motor drive to rolls, via silent chains or belts, using suitable speed reduction mechanism, is the most common construction in moulders. Gear and chain lubrication has been discussed heretofore under Dividers and Mixers. Bearing lubrication involves no special difficulties, such parts being so arranged as to entail little or no possibility of the lubricant con-

taminating the dough. It is common practice on bearings of this type to install grease cups, since they are relatively small and are usually not built with automatic oiling devices such as chains or rings. For this service a light-bodied compression cup grease is most suitable.

The Modern Oven

In the modern traveling oven lubrication is an important factor in the attaining of maximum efficiency. It can be readily appreciated that shutting down of the oven would absolutely terminate production over the period of shut down. Though the driving mechanism for the conveyor, and the component parts of this latter are rigid in construction, they require quite as much attention from a lubricating viewpoint as any other machinery in the bakery.

In operation conveyor chain links, rollers, bushings, and rods are subjected to most exacting service and normally are expected to run for indefinite periods without extensive repair. Of course, this can only be assured by proper lubrication. In general, lubrication of such parts is quite a problem due to the heats involved, and the usual grades of lubricants will not stand up for any length of time under these conditions. As a result there is a tendency of the operators to give the matter up as a hopeless job, and neglect oiling such parts entirely. For this service, all wearing parts exposed to oven temperatures should be lubricated with a relatively heavy mineral oil that will not undergo sufficient reduction in viscosity to drip or flow from the wearing parts. A viscosity of 1,000" Saybolt at 210° F. would be adequate in usual service. Many engineers, however, prefer to use a mixture of graphite and light mineral oil. The latter will naturally evaporate rapidly, but the graphite residue is claimed to

work its way into the rolls quite effectively to insure proper lubrication.

Conveyor driving mechanism involves simply a problem of gear and bearing lubrication. Gearing is generally of exposed type, operated at relatively slow speeds. For this purpose a pure mineral gear oil of about 2,000" Saybolt viscosity at 210° F. furnishes an excellent and most durable film of lubricant. Bearings for gear shafts, driving motor and conveyor sprockets are either of the chain or ring oiled type, or else of simple split bearing construction equipped with sight feed oil cups. In either case a medium-bodied engine oil of from 300 to 500" Saybolt viscosity at 100° F. will be found quite suitable.

In the rotary or revolving type of automatic oven worm gear drive is customary. On such service a pure mineral oil having a viscosity of about 120" Saybolt at 210° F. will be satisfactory. Other parts requiring lubrication such as gearings, etc., should receive the same oil as explained heretofore; or if grease lubrication is called for, a light-bodied compression cup grease will be suitable.

Wrapping Machinery

To conform to modern advances in sanitation and public health, it is becoming the practice today to have each loaf of bread suitably wrapped in an air-tight package to prevent entry of impurities and maintain its original freshness upon delivery to the customer. As a result, the automatic wrapping machine has been developed.

No especial problems are encountered in this respect on the modern bread wrapper. As usually designed it is constructed (or oil cup lubrication with the exception possibly) of the main drive and paper roll bearings, which may be equipped for grease lubrication. The oil to use for

such service should be a relatively light-bodied, pure mineral product of 200" Saybolt viscosity at 100° F. When a grease is called for a light-bodied, low melting point compression cup grease will be found quite satisfactory. Whatever the means allowed for lubrication, a certain amount of care should be observed to insure against splash or dripping.

Miscellaneous Equipment

Other appurtenances of the modern bakery, such as conveying apparatus for handling the loaves and specialty machines, including cake mixers, pie crimping machines, meringue mixers, etc., involve no specific lubricating problems. Where oiling is necessary, a good light-bodied compression cup grease, or medium viscosity pure mineral oil of 300" Saybolt will be suitable.

Conclusion

In view of the importance that lubrication bears to the efficient operation of baking machinery, it can be readily appreciated that the utmost care should be observed both in the selection of the lubricant and in its actual application. The popular fallacy that an oil is "good enough" just because it apparently lubricates, must be discarded. As has been stated above, baking machinery involves the frequent possibility of contamination of the dough on account of dripped or leaked lubricants. The use of inferior, poorly refined, perhaps adulterated oils may easily result in the baker losing an entire batch of dough, or even becoming involved with the health authorities, to the certain detriment of his business. It will therefore be his best safeguard to use the same judgment in the selection of his lubricants as in the selection of his other working materials; and to apply them to his machinery with the same care as observed in mixing his dough ingredients.

Health Protection for Wheat

Why Science Must be Called in to Prevent Rust Ravages in Our Fields

By E. C. STACKMAN

Pathologist, Bureau of Plant Industry, U. S. Department of Agriculture

ARE the bakers of America, as members of the great industry which serves to the people more closely than any other industry their daily Staff of Life, interested in the health of wheat fields?

Assuredly they must be for wheat is the only cereal which contains the elastic substance called gluten in quantities enough to furnish us well leavened bread.

A foe of the wheat fields, therefore, which attacks the wheat as mysteriously as gangrene attacks the human body, or the bacterial disease called "rope" attacks flour, or mold attacks bread, is to be assailed with all the power the bakers of America can exercise in cooperation with the Federal government and the members of the other great industries from farming to freighting, which are based on wheat-field prosperity.

Bakers in every community can help their congressman push bills for the eradication of the most serious menace American wheat fields now face—provided they know what this menace is and how it is to be assaulted. The article printed below was prepared by a hard-working scientist whose life work is given over to the attack on those mysterious air-born spores with which mankind is in daily competition for his food and even for life itself. He tells here how barberry bushes jeopardize the health of wheat fields and even destroy them, if not eradicated.

For at least two hundred and fifty years farmers in Europe have known that black stem rust was destructive to wheat

and other grains growing near barberry bushes. Farmers in the United States have known this fact for over two hundred years. It was not known until 1860 just how barberry caused rust on grains but it was known that it did cause rust. And it was known that the frequency and severity of rust attacks increased as the number of barberry bushes increased. So destructive did the black stem rust become in many districts in which there were large numbers of barberry bushes that the farmers clearly saw that they would either have to stop growing wheat and other grains or destroy the barberry. Many of them voluntarily dug their bushes but some of their less progressive neighbors did not, and therefore barberry eradication laws were passed.

First Eradication Law

The first barberry eradication law apparently was passed in Rouen, France about 1660. It is known with certainty that Massachusetts, Connecticut and Rhode Island, in the North America Colonies, passed laws against the common barberry long before the Revolutionary War. Laws also were passed by various German states about 1800. The fight against the destructive barberry continued until several of the western European countries, either with or without the aid of laws, succeeded in destroying the barberry.

At the present time there is legal provision for the eradication of barberry bushes in Norway, Sweden, Denmark many states and provinces of the German

Empire, Hungary and several political divisions of France. England got rid of most of the barberry bushes in the agricultural districts without the aid of a law, and there are but few bushes in Holland, Austria and other grain-growing regions of Europe. What has been the result of these campaigns against the barberry in Europe?

It has been demonstrated clearly that the destruction of the barberry resulted in the virtual elimination of black stem rust from some regions. In others the rust now appears so infrequently and so late in the season that it does no damage. What little rust does develop may come from a few barberry bushes which still remain in the immediate region or it may possibly be blown in from a distance. But it is perfectly clear that when the barberries are completely removed from a given region, that region is well protected from rust. Apparently not enough rust spores can be blown in from a distance to cause the development of an epidemic in a region which is free from barberries.

Where Rust Devastates

There are few barberry bushes in Hungary, Austria and Czecho-Slovakia, and black rust does practically no damage. In the mountains of northern Italy there are many wild barberry bushes and rust often is very destructive, but in the southern part of the country there are few bushes and the rust does very little damage. This statement was made by one of the most eminent Italian mycologists and the writer is convinced of its correctness by personal observations. In 1914 black stem rust was found for the first time on wheat in a limited area about 65 miles southeast of Rome. The rust was traced to several barberry bushes which had been planted. Some of these bushes were removed in the same year, and the next year

the rust did not reappear near where they had been. However, it again appeared near the remaining bushes. They were then eradicated, and stem rust never has appeared since that time.

In Spain rust appears earliest and does most damage near barberry bushes. There are very few barberries in the principal grain-growing regions of France: they have been eradicated as a result of laws and local ordinances. As a result, black rust is not considered a destructive disease. When it does appear it comes too late to cause appreciable losses. But in the mountains of France, where there are tremendous numbers of barberry bushes, black rust is extremely destructive. The writer searched long and faithfully for black rust in France during the past June. There was none in the great wheat-growing regions, but in the mountains the situation was entirely different. The peasants grew practically no wheat because they said black rust nearly always destroyed it. They grew small patches of rye which were already black with rust on June 15. I counted thirteen common barberry bushes in one small field and the rye was black with rust from top to bottom. The situation was the same in the entire region—barberries covered with rust and the rye and grasses black with it. And at this time not a single pustule of stem rust could be found in those regions of France from which the barberries had been removed.

The situation in Germany is essentially similar to that in France. I searched diligently for rust in Bavaria, but could find none except in the mountains where there were barberries. German pathologists say that there are few barberries in their country, except in the mountains. Whenever a destructive outbreak of rust occurs, it usually can be traced to bar-

berry bushes. In a publication of the Bavarian Institute for Plant Culture and Plant Protection it is stated definitely that severe losses from stem rust can be prevented by eradicating barberry from the vicinity of grain fields.

Rust and the Barberrry

English pathologists are unanimously agreed that black stem rust cannot exist in that country without the barberry. The only rust I could find in England was near three common barberry bushes which were being kept for experimental purposes a few miles from one of the universities. In Scotland there was not the slightest trace of black rust except near barberry bushes. The same thing was true of Wales. There still are many bushes in some of the hilly country of Wales and there rust is destructive. England has controlled rust by eradicating barberries. Before the bushes were removed the records show that rust was destructive; now it is not.

Denmark has shown most convincingly that black rust can be controlled by barberry eradication. After many attempts to destroy the bushes, a law was passed in 1903. The Danes did a thorough job of removing the bushes. There had been destructive epidemics in that country in 1889, 1894, 1895, 1896, 1897 and 1901. Rust also had been destructive in 1893, 1898, 1900 and in 1903. Since 1903 there has not been a single general epidemic. Whenever an outbreak of rust appeared in Denmark since 1903 it has been traced to barberry bushes which were missed in the campaign of extermination.

Through the kindly assistance of Danish pathologists the writer made personal observations on many grain fields during the past summer. The only black stem rust which could be found was near straggling

barberry bushes which still remained in woodlots.

Unquestionably barberries cause the development of black stem rust in Europe. Where there are barberries there is likely to be very heavy rust; where there are none, the rust seldom appears in sufficient quantity to do any damage. In many places in Europe it has been necessary to discontinue growing small grains on account of the presence of tremendous numbers of barberries. In certain districts of Sweden it is even impossible to grow certain varieties of oats successfully.

The American Campaign

In the United States the campaign for the eradication of barberry was begun in the spring of 1918. The first barberry eradication law was passed in North Dakota in 1917. Since that time legislation has been made for eradication in the following states: Montana, Wyoming, Colorado, North Dakota, South Dakota, Nebraska, Minnesota, Iowa, Wisconsin, Illinois, Indiana, Michigan, and Ohio. In addition, the Federal Horticultural Board has issued an order prohibiting the shipment of barberries into the thirteen states in which the barberry eradication campaign is being carried on and prohibiting also the interstate shipment of barberries within that area.

It should be remembered that the barberry eradication problem is regional. Barberries in the southern states do not cause rust. The rust in the extreme south lives throughout the winter in the summer spore stage and is therefore independent of the barberry. This, however, is not true in the northern states. It often is asked whether the rust can be blown up from the south to the north. Careful observations and experiments have been made on this problem since the fall of 1917. All of the evidence available at the present

time indicates that the principal source of rust in the northern states is the common barberry.

Eradication Work Urgent

The barberry should be eradicated immediately. There still are thousands of bushes in the wheat-growing states. About three and one-third million bushes have been found in the state of Wisconsin alone. In the entire barberry eradication area approximately seven million have been found since the eradication campaign was started.

These bushes produce seeds which are distributed by streams of water, by birds and by other agencies. These seeds sprout and produce new bushes. During the past season about 130,000 new bushes were found. Assuming that each one of these bushes produced only fifty seeds which germinated and produced new bushes, the number of seedlings from these bushes would be 6,500,000. Every standing barberry bush therefore is a menace, not only because it develops rust but also because it continually produces more bushes.

How much damage can one barberry bush cause? During the summer of 1922 it was found that in Decatur County, Indiana, the rust spread at least five miles from one bush. Approximately thirty-five farms were affected by the rust. The farmers on eighteen of these estimated the total loss caused by the rust which had spread from this single bush at 12,520. If a single bush is capable of causing this much damage in a single year, certainly no one can object to the eradication of the shrub.

There are two principal varieties of the common barberry—the green and the purple. The green variety is not a particularly desirable ornamental plant. The purple, on the other hand, is sometimes quite beautiful. However, it can be replaced

with other shrubs. It is just as susceptible as the green form and should be eradicated. It is particularly fortunate that the Japanese barberry, which is more beautiful than the common barberry, is immune from rust and therefore can replace the more susceptible common form.

Salt Is Sure Death

Doubt has been expressed as to whether it would be possible to eradicate completely the tremendous numbers of barberry bushes which now exist. In northern Europe they have used crushed rock salt successfully to kill the bushes. About five pounds are applied to the base of the bush at any time of the year. This is sure death and is much more satisfactory than attempting to dig the bushes. In this country the use of ten pounds per bush is usually recommended.

This much is absolutely certain—if the barberry bushes are not eradicated but are permitted to remain and increase, the damage from black stem rust certainly will be even greater in the future than it has been in the past. Progress is being made by plant breeders and plant pathologists in the production of rust-resistant varieties, but we must also stop the rust at its source—the barberry. There is no guesswork about the necessity for eradicating the common barberry. The fact that it gives the black stem rust a start in the spring is as thoroughly established as any scientific fact can be. In order to preserve the grain crops of the present and to protect those of the future, it is absolutely essential to get rid of the common barberry.

We are very much interested in "Baking Technology." We are a Bakers' and Confectioners' supply house and want to keep right up to the minute in the baking trade.

—Bowes Co., Ltd., Toronto, Canada.

How the Homogenizer Helps

Used with High Speed Mixer the Newly Invented Machine Adds to Loaf's Volume Grain and Texture Without Affecting Weight

By A. W. LANDSTROM

To bring reliable information to the bakers of the country about new machines claimed to be of value to them is one of the purposes for which the American Institute was founded. One such new machine "the homogenizer," intended to break up ingredients into much finer form than formerly was possible, has been submitted to us for tests and reports. This is the third and final paper on the effects of this machine when used under many different shop and laboratory conditions.

PREVIOUS reports of the effects of homogenization of bread ingredients under medium speed mixing conditions have been published in the December 1922 and January 1923 numbers of BAKING TECHNOLOGY. In the following article we will give results obtained in a large commercial shop where this process has been studied using a high speed mixer.

Any method which results in the thorough mixing of the ingredients of a dough batch should be an important factor in the production of better bread. Homogenization of the shortening, malt extract, sugar, milk and water produces a highly uniform mixture which ought probably to have the effect not only of producing better bread, but in addition, of influencing favorably the prevention of losses due to evaporation of water and other volatile substances from the bread. The uniform distribution of fatty compounds, such as shortening in the dough, is probably a factor in this problem.

We would expect also that homogenization of ingredients followed by mixing in a medium or slow speed mixer, would give a more uniform dough and somewhat better bread than medium or slow speed mixing alone. The results of the two series of experiments already reported have indicated that this is the case. Data on the effects of homogenization followed by high speed mixing were not reported in the previous study.

The following experiments in connection with high speed mixing are no exactly comparable with those reported previously since it was necessary to use in this investigation the sponge and dough method. In the previous work with the medium speed mixer, we used straight doughs. However, we believe the results are of sufficient importance to present a fairly accurate indication of the effects of the homogenization of ingredients in a high grade commercial shop in connection with the sponge and dough method and high speed mixing.

Formula Used

The formula contained six percent Sweetened Condensed Milk and 2.4 percent lard. The absorption was 60 percent in the sponge and 62 percent in the dough.

Equipment

The equipment used was as follows: a high speed mixer, a "Dutchess" divider, a "Petri" rounder, an automatic overhead proofer so adjusted that dough was proofed for 8 minutes, a "Thomson" moulder and a "Baker-Perkins" gas fire travelling oven equipped with 8 thermocouples for recording temperatures.

Details of Experiments

Five hundred pounds of flour were used for each dough and four doughs studied, i. e.—two "homogenized" (Doughs No. 1 and 4) and two made in the usual manner.

Doughs No. 5 and 6). The same absorption was used throughout. Sponges were made as usual in all experiments. At the time of mixing the "homogenized" dough, the "emulsion" of sugar, condensed milk, lard and one-fourth of the water to be added at this point, which had previously been run through the homogenizer, was added with the remainder of the ingredients and mixed for approximately seven minutes. The dough was then transferred to the trough and fermented, divided, etc., according to the schedule of the shop. The "regular" or "control" doughs were treated in a like manner except of course, that the lard, sugar and condensed milk, etc., were put directly into the mixer at the time of mixing the dough.

Because the dough stage was short no attempt was made to check fermentation losses as under the conditions of these experiments, such losses were probably insignificant.

Ten loaves were taken at random as delivered from the moulder and weighed on a balance accurate to .1 gram, then panned, proofed and baked in the usual manner. The time of entering the travelling oven was observed and the oven temperatures noted when the bread had travelled half way through the oven. The resulting loaves were weighed on a balance accurate to .1 gram immediately upon coming from the oven and again when they had cooled for one hour. The temperature and humidity of the room were noted as the bread came from the oven and again after the bread had cooled thirty minutes and sixty minutes. Moisture determinations were made on the dough "out of the mixer" and upon the resulting bread. These moisture determinations were made according to the methods given in the December 1922 number of BAKING TECHNOLOGY and

volumes of bread determined as noted there. Several loaves from each dough were scored by two members of the Institute staff and the average score reported.

Calculations

Oven losses are expressed as per cent of the weight of dough as it was panned and one hour losses are expressed as per cent of the weight of bread "out of the oven."

Tabulation of Results

Dough number	3	4	5	6
Absorption Per Cent.....	62	62	62	62
Temp. Dough, Deg. F....	81	81	81	81
Percent Moisture, Dough				
out of mixer.....	44.33	44.77	44.60	44.08
Time of Baking—Minutes	34"	35"	33"	37"
Temp. of Oven (Average)				
Deg. F.....	446	443	447	443
Oven Loss (Per Cent of				
Dough to pan).....	9.6	10.2	10.2	10.5
Storage Temp. Deg. F....	77	79	79	78
Storage Humidity, Per				
Cent	58	58	58	63
One Hour Loss (Per Cent				
of bread one hour old).....	1.9	2.0	2.0	2.0
Av. Moisture, Bread one				
hour old.....	36.75	36.98	36.98	36.63
Volume of loaf e.c.....	2159	1980	1917	1900
Volume of loaf e.c. per				
pound of bread one				
hour old.....	2054	1996	1876	1927

Score of Loaf

	3	4	5	6
Volume	10	9½	8½	9
Color of crust.....	7	7½	7	7½
Symmetry of form.....	2½	2½	2	3
Evenness of Bake.....	2½	2½	2½	2
Character of Crust.....	3	2	2	2½
Break and shred.....	2½	2½	2	1½
External Total	27¼	26¾	24	25½
Grain	9	8½	8	8
Color of Crumb.....	9½	9	8½	8½
Flavor	14	14	14	14
Taste	19	19	19	19
Texture	19	14½	13½	13
Internal Total.....	65½	65	83	62½
Total Score	92¾	91¾	87	88

Discussion of Results

It is evident at once from these results,

that no great differences due to homogenization when used in conjunction with high speed mixing, were obtained in oven losses, or weight losses after storage of baked bread for one hour. Homogenization, however, appears to produce bread which scores higher under these conditions, both the external and internal scores being improved by the application of this process. The average "homogenized" total score was $92\frac{1}{4}$ as opposed to $87\frac{1}{2}$ obtained by usual practice.

It does not appear from our data that under these conditions the moisture content of the baked loaf (one hour old) is much affected by homogenization, as the homogenized loaves showed an average moisture content of 36.87% as opposed to 36.80% obtained from loaves where ordinary mixing procedure had been followed. These moisture data we consider to be representative, as the oven temperatures were closely controlled (see tabulation of results), so that the baking periods differed on an average by only one-half minute. Further, the arrangement of burners and the construction of the oven was such as to insure an even distribution of heat. While the above "Oven Losses" are not strictly losses due to baking alone, since loaves were weighed as taken from the moulder, we believe they are representative and comparable since the loaves were treated similarly from this point in the process. The loss in weight due to proofing in an atmosphere so highly charged with moisture as is that found in a modern "steam box" would be negligible when compared with the loss due to baking.

Conclusions

From the above work it seems that homogenization in connection with high speed mixing and a sponge and dough method of making bread with a short

dough stage has little effect upon either oven losses or losses in weight of bread stored for one hour.

Further it seems to have little if any effect upon the moisture content of the bread produced, when this is determined after the bread has cooled one hour. However, a marked improvement in favor of "homogenized" bread is evident when considering the score of the resulting bread. Homogenization seems to improve both the external and internal characteristics of the loaf, giving a slightly better break and shred and character of crumb and a better volume, grain and texture than that obtained with high speed mixing alone.

How Old is Old?

An old man was climbing a hill on foot in Butte and a man still older in years but much younger in the spirit of life was grinding up the same hill in low. The latter greeted the man on foot and a visitor in Butte who was riding with the young spirited man asked who his venerable friend might be.

"The oldest baker in Butte," the man in the automobile replied. "He is out of the game now. I begged him time and time again to buy newly-invented machinery as it came out. But he insisted steel dough troughs would chill his doughs, and he clung to the old wooden trough. He insisted no machine could mix dough like he could and he would never buy a mixer. At last I insisted until he said he would get lonesome without his hands in the dough mix. He had had them there all his life. Well, he will fill one time and nobody wanted to work in a hand-mix shop. He lost all his trade and when he got well again he found himself out of luck and out of a bakery to

The man in the automobile was ac

next oldest baker in Butte. He was Jake Osenburg, whose plant is equipped with modern machinery until it is almost "fool proof." As for Jake Osenburg himself, he is one of the best elk and deer hunters in the Rockies. And his visitor from the American Institute of Baking had a chance to witness his prowess with a rifle in the form of several fine deer and elk heads, ready for mounting. Thus Osenburg, by being progressive, has been able to take the drudgery out of his own life and load it onto the fine modern machines that are doing so much to revolutionize the making of the modern loaf.

Allied Tradesman Profits

A wise salesman of any product used by bakers is he who has had his hands in the dough trough and knows the baker's problems all the way through. F. Z. Wright was a salt salesman selling salt to bakers for the Diamond Crystal Salt Co., and he was not satisfied with himself. He obtained permission to spend his spare time at the American Institute of Baking. After a few days playing with salt in dough mixes he reported that he simply must take the bakers' course. He is a student at the Institute now—and here is what he says of our school:

"It has been worth a great deal to me, for now I know the what, why, and wherefore, of each baking operation. Also I know the tremendous difference that different kinds and quantities of salt make in fermentation."

What Mr. Wright is doing, hundreds of other allied tradesmen can do. The Fleischmann company was among the first to send young men here for a knowledge of baking that would make them more valuable in the production and sale of yeast. Similarly some of the largest flour mills are now co-operating.

A Veteran's Message

How many veterans of the baking industry remember Robert Morton? In 1901 he was president of the American Bakers Association. He was its fourth president, succeeding Charles Schneider, Lewis J. Kolb and John E. McKinney.

In Los Angeles, on the evening of January 25, about 300 bakers with their wives and friends were assembled in one of the finest banquets and dancing parties the industry's members have ever enjoyed. As the strains of "Three O'Clock in the Morning" floated out from the dance orchestra, there was a sudden pause. Into the room, in a wheel chair, Robert Morton was brought with the aid of a loving daughter and grand-daughter. He was ninety-three years old. His power to hear had left him but not his power to think and to speak. In strong, clear tones he spoke, as from another generation, concerning the work the bakers of America have to do in marshaling their forces, uniting their strength in a single head,—the American Bakers Association,—and supporting a scientific institute that will keep them always abreast of the changing times in nutritional habits.

Mr. Morton then told of the old "Scotch Bakery" his father had started in Brooklyn and of the 200 years during which his people had always been bakers. He laughed as he told of the "antiquated" methods he thought were modern in his day and of the "antiquated" methods of today as they would be viewed by the youngster of today when they should gain his own age and experience. The impression of the fine, old man coming in upon the bakers' gathering was one of the most impressive things any members of our industry have had the pleasure of participating in.

Books for the Bakery Owner

THE DAYS OF A MAN. Memories of a Naturalist Teacher and Minor Prophet of Democracy. David Starr Jordan, World Book Co., Yonkers, N. Y. 2 vols. 1616 pp., 112 illustrations.

The modern baker who sees the need to bring scientific control into his bakery and human contacts into all his relationships with the community life around him, will find a great deal of intellectual comfort in the two massive volumes of Dr. Jordan's memoirs.

Just as the baking industry is being industrialized to-day after ages and ages of existence as the world's most useful handicraft, so the world at large was moving over to the Industrial and Scientific viewpoint when David Starr Jordan began his work in life.

In the world of education he has been a hardy and most unusual pioneer. He was fitted to lead in introducing Science as the foundation stone of University life in America for the simple reason that while he was deeply religious at heart he hated quarrels over dogma as things unworthy of the serious attention of mankind. It was his privilege to be born among bitter religious controversies so he developed an early immunity to such futile quarrels and instead gave his youth to the study of flowers, rocks, fishes and animal life. At Cornell, where it was his privilege to be one of the first students to be welcomed to the college campus, he heard denunciations of the "Godless spirit" of scientific teaching from the nearby pulpits. But he smiled and thought of the newborn love of God his scientific studies had given him.

Again at Penikese Island it was Jordan's privilege to be a personal student of Louis Agassiz, when this great pioneer among scientists made the lessons of the deep seas intelligible by feeding his students some fish for lunch and then telling them all about the life story of the bony skeletons left upon their luncheon plates.

In his adventures as an inspired and inspiring teacher Dr. Jordan encountered much that fitted him to comprehend the feelings of George Haffner, whose suggestions that the World of Bakerydom was worthy of scientific study, were greeted with such jeers as "O, you Doctor of Doughnuts," and "Poor Professor of Pumpernickle."

Yet just as Haffner lived to see a full fledged School of Baking in the headquarters of his own National Association itself, so Jordan lived to see

himself, as the first president of Leland Stanford, Jr., University, assembling scientists from all the world to make a first class scientific faculty, to which all other phases of campus life should be subordinate.

It is at the university launched by Dr. Jordan with the money of the late Leland Stanford, that Dr. Alonzo Taylor, Dr. Joseph S. Davis, and Dr. Carl Alsberg now carry on researches into baked products for the University's Food Research Institute. It was there that Herbert Hoover received the education which made him a commanding American in the crisis of the World War.

In his memoirs Dr. Jordan leaves out little if anything of what he has seen among fishes, among sheep, among statesmen, among Nations, since he began his career as a "minor prophet of democracy."

There are those in the baking industry who in a measure duplicate his career. For instance H. H. Haynes, of Portland, feels keenly his duty to know and sense every phase of civic and industrial growth, and he spends much more time outside of his bakery, in Chamber of Commerce meetings, social welfare work, and civic activities than inside with the dough. Again Gordon Smith in the South, Mr. Van de Camp, in Los Angeles, Dent Harrison in Montreal, Mr. David Ackerman in Spokane, Bryce Smith in Kansas City, where he is Acting Mayor, and a host of other bakers who believe in fulfilling their social and community duties, bespeak the new day in our Industry. All who are looking forward with this group will gain a new insight into the world around them from an intimate acquaintance with the Jordan memoirs.

He not only tells how Cornell University was founded in protest against the more exclusive colleges such as Yale, Harvard and Princeton, but he tells how Stanford University was founded to still further democratize the world of education. It is only a step from the world of his friendships and experiences over to the American Institute of Baking and its college degree of A. B. which means A Baker.

From all parts of the country bakers write in that they have calls for material for speeches they are invited to make before women's clubs, Rotary clubs, Kiwanis clubs, chambers of commerce and various civic associations. To this

group, as well as others, Dr. Jordan brings a rich fund of enlightenment and understanding. He is still alive, living in a home on the Stanford University campus where the leading of youth into the pathway of the modern Scientific Viewpoint remains the one guiding passion of his life. His memoirs are published by one of his first and most devoted students, Caspar W. Hodgson, of Yonkers, N. Y.

I. K. R.

Abstracts of Technical Articles

Selected for Baking Technology from *Chemical Abstracts*

Biscuit and Cake Manufacture. II. Washington Platt. Chem. Age (N. Y.) 30, 203-6 (1922).—CF. C.A.16, 1993. Biscuits, drop cakes, pound cake and sugar wafer tops as affected by the use of milk are discussed. In biscuits the only value derived from use of milk comes from the butter fat present, which can be cheaply and advantageously replaced by the use of an equivalent amount of butter instead of milk. In drop cakes and pound cakes the butter fat in milk has a value equal to butter fat in an equivalent amount of butter and the milk has an emulsifying power of great value, which recommends its use in these products. In sugar wafer tops the emulsifying power of milk is essential.

LILLIAN OFFUTT.

Flour Prepared for Infants. E. Gorter. Nederland. Maandschr. Geneeskunde, 10, 229-42 (1921).—The article is intended as a popular propaganda against the misuse of commercial flour preparations intended for infants. These consist of starch and are quite insufficient for nourishing babies. The flour not only lacks protein, fat and salts, but also vitamins A and B. This is illustrated by experiments on animals.

R. BEUTNER.

Preparing Yeast for Food. H. Plauson. U. S. 1,415,469, May 9. See **Edible Yeast Preparations.** H. Plauson and J. A. Vielle. Brit. 156,153, Dec. 31, 1920. To improve the taste of yeast and to render it more digestible it is treated with H under heat and pressure. It may first be treated with a solution containing $(\text{NH}_4)_2\text{CO}_3$ or Na_2CO_3 or borax and washed to remove the bitter flavor, and disintegrated in any known way. It is then treated with H at a pressure of 100-200 atmosphere and a temperature of 100-130 de-

grees. The liquid thus obtained may be used directly, mixed with fats or oils to form an artificial milk, or dialyzed by electro-osmosis or otherwise to remove salts. The action is facilitated by the presence of small quantities of NaCl, or organic acids such as HCCCK, HOAc, tartaric, or nitric acid. The yeast may also be first reduced to dry powder and treated with H in this state. Catalysts such as Wi or Pd may be employed, in which case the yeast must be washed after treatment.

Meal Catalase. Th. Merl and J. Daimer. Z. Nahr.-Genussm. 42, 273-90 (1921).—From wheat germ dried catalase was prepared which showed 5 times the catalytic strength of the original material with a 14% yield. The optimum temperature of reaction for meal catalase lies between 30 and 40 degrees and the temperature coefficient is about 1.5 between these points. The relatively great resistance of meal catalase to dry heat, its apparent increased sensitiveness to moist heat and its low resistance toward high temperatures in aqueous extracts have been established. Observations upon the influence of H-ion concentration upon the speed of reaction of this catalase indicates that the optimum point begins at ph. 6.2 and extends into the alkaline side of neutral. The optimum range varies with different buffers, phosphate ions bringing the beginning of the optimum to ph. 7. While both acetate and lactate ions retard the speed of reaction this effect is stronger in the former. From the behavior of meal catalase with trypsin conclusions as to its albuminoid nature cannot be drawn with certainty as with animal catalase. Baking experiments indicate that in usual baking processes the influence of catalase is of minor importance.

L. D. E.

Uniform Flour. J. R. Hess and W. L. Rainey. J. Am. Assoc. Cereal Chem. 7, 65-73 (1922).—There are no reasons why different laboratories cannot check on H_2O , ash and protein determinations. The amounts of total H_2O solution and solution carbohydrates have a marked effect on making uniform flour; they can be controlled by proper blending. The length of tempering affects the uniformity of flour. The amount of protein does not seem as important as keeping the relation of total protein to the other constituents.

L. O.

Getting Over Trade Secrets

How Those Who Have Abandoned Foolish Fetishes Have Found It Paid In Increased Quality To Do So

HAVE you ever had the experience of visiting a baker who immediately closed the door leading from his office to the plant and then explained he could only see you in the office—his plant had many features that were the secrets of his firm?

And have you then had the experience of having the baker make a special—a very, very special—exception in your case so that you were permitted to see his great SECRETS?

And have you on viewing them, found them to be just the same as you have seen in hundreds of other bakeries?

On the west coast a baker nursed one secret. He was offered for a huge sum a secret formula. If he had only sent it in to the American Institute of Baking we probably could have sent him a dozen formulas that would have possessed all its merits without costing him the huge sum this one did. He bought it from a glib salesman who knew little or nothing about baking but had a reputation as a "health crank." The baker found it to be of no value to him, particularly. Yet he was sued in court by the salesman who hadn't got a name on the dotted line to see his prospect walk away from him. A jury of women, called in because the case was a "bread case," duly found for the glib-tongued salesman in the sum of \$6,000. It was a terrific verdict.

Hundreds of bakers who knew better than to nurse the foolish tradition of shop secrets sent their bread here to be scored last month. They wanted to know how it "stacked up" with other bread in the country at large.

One maker of rye bread got the lowest score of all. He was furnished some of the Institute's many formulas that had been scientifically tested out, and advised how to raise his score by at least twenty points. He did it for a while.

Then he sent in some more very bad bread. What had happened? He found his old rule-of-thumb baker had insisted on going back to his own shop-evolved formula. He simply would not learn new ways. Otis Hall, head of the Service Department, American Institute of Baking, wrote for the details of one baker's shop practise and received in response this rather remarkable avowal of bakery ownership of today:

"As to formulas and details, I will send you exact figures as to weights and materials used, methods, temperature of doughs at different stages of fermentation, also time, both in proof box, dough, and oven, in fact every detail so you may tell my shop methods almost as well as if you saw me at work. I DETEST SECRETS. If what little I know will help anyone else, praise the Lord. Sincerely, J. F. Gemming, Blandsville, Ill."

It is for such bakers that the American Institute exists—to make the **QUALITY LOAF THE ONLY LOAF** that American housewives can come in contact with.

During January 101 bakers sent in their bread to have it tested, in comparison to that of other bakers, and to have it submitted to an analysis coupled with suggestions as to how it might be improved. In most cases they were remarkable loaves compared with those sent in from the same plants a month earlier.

BAKING TECHNOLOGY

*A Journal of
Applied Science
in Baking*



*Published by
The American Bakers Association
March 30 1923*

Vol. II

CHICAGO, ILLINOIS, MARCH 15th, 1923

No. 3

To Share and Share Alike

WHEN good bakers from nearby towns or nearby streets solicit other bakers this month and next to join the American Bakers Association no baker has any right to receive the request with suspicion and a fear that there's "something in it for the other fellow."

There's positively nothing in it for him. The soliciting baker is only one who is awake to the vast volume of the tasks that American bakers have to do. He knows that these tasks are such that only a National headquarters, speaking for the whole baking industry, can attend to them with authority, with power, and with a

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backing that will command respect.

It is now well known, for instance, in Washington that only 500 out of 32,000 bakers in America, are dues paying supporters of the American Association.

With this fragile backing our committees have to appear before the Tariff Commission and ask for a fairer tariff on almonds, walnuts, and other supplies. This fairer tariff can be won, for the "talking points" against

the recently swollen tariff are all on the bakers' side.

At the same time another committee has to urge a lowering of the express rates on baked goods. It has to counter the

strategy and the efforts of the express companies. There is a public hearing at Washington coming due. There was one recently held in Denver.

Before these public hearings our attorneys have to stand and meet the question: "Who do you represent?"

The same question comes up again before the Federal Trade Commission. This Commission has set forth among the sins of merchandising the particular sin of selling below cost to make bread a leader. We can ask the Commission to take a hand in the chain store battle—the worst our industry has to face.

But everywhere through the warp and woof of Uniting Bakerydom runs a sad refrain: "Why should I carry the load when the other fellow who won't carry any of it receives share-and-share alike of the benefits whenever we win out?"

Does any baker imagine that this is not discouraging? Discouraging to the best spirited and the boldest pioneers in our industrializing world?

They are driving our world forward from the old handcraft days to a day of complete industrialization. But in this work they have not yet the proud satisfaction of saying "we are doing this work share and share alike."

A Case in Point

J. J. Haynes and his partner, Foster, of the Haynes-Foster Baking Co., know just what we all know about this business that brings one baker to see his neighbor in this springtime drive.

Haynes comes of old pioneer stock. His father once built a runway for logs and curved the end upward at the bottom to stop the logs from plunging too speedily into the river on whose bank the runway was. Only he built the curve too long. The speeding log took the up-curve at such speed it catapulted like a projectile,

far up in a half circle above the river water. It landed far across on the other side, on dry land.

Young Haynes took a lesson from that incident. He has never tried to work with an organization or a machine that was not all it should be. He is one of the bakers who will visit his neighbors to get support for the National Headquarters of the American Bakers Association on a basis of "share and share alike."

He won't try to win 10,000 new members. Five hundred will do for the present. That will double our present roll, and give us an opening wedge into affairs of Science, of Politics, of Statesmanship, of Publicity, of Service on which the Quality Loaf of the future must be built.

Out West, too, they know a story of a man who wouldn't cooperate. Will Matthaei told it to the writer. In the ox-team days on the Oregon trail, ten families were trying to forge through to a new valley. They encountered a region north of Mount Ranier that sits in lordly grandeur to-day above the Matthaei bakery. Eighteen out of the nineteen men in the pioneer party manfully took turns going on ahead and rolling rocks out of the pathway of the oncoming ox carts.

Safe But not Sane

But the nineteenth lurked in the background, keeping himself always too far back to be called upon for labor.

"Well," he replied when a committee visited him, "you can't ROLL UP THE ROAD behind you."

The man spoke the truth. None was vengeful enough to work in obstructions although they might have done so in such volume that the parasite-member would have perished.

He won through to the present site of Tacoma City—but the story always clung to him. Nobody thought of him as all

bakers think of Mr. Bradley of Spokane, or Ed. O'Connell of Great Falls, or Mr. Matthaei, or Mr. Goldie of Sacramento. Always he was pointed to as the man who would not do his part and he died alone, in the shame of all the fellowship of his day.

We have never yet met the counterpart of this man in the baking industry. We have only met men who cherish old grudges over events that have long passed and should have been forgotten. They use these old feuds as an excuse for not joining the National. And we have only met those who have not yet awakened to the meaning of the word "cooperation" and "National organization."

For all such this Spring campaign is a scheduled period of a Spring awakening.

Don't think, while you are being asked to join, that American Bakers are alone in any way—either in the need for members or in the good that a sturdy membership can do.

There is the Spring campaign of the milk producers, for instance. They are strengthening their organization on the rocks of Past Performances. No one has to be told how they have chained Science and made an ice cream brick more tasty, more appealing to the eye, more soundly kept for the customer's dinner table than ever before.

Milkmen in Drive Too

No one needs to be told how, instead of just selling milk they divided the business into the fluid milk, the condensed milk, the dry milk, and the ice cream business and took hold of each and every phase of MILK MERCHANDISING until they made it 100 per cent effective.

One form of milk usage invades directly the bread field. This is the "Eskimo pie" which they bring within the reach of almost every American boy. He is worked

upon to ask for it instead of a sandwich from mother when tired after hard play.

The Quality Product

Any baker in doubt whether the American Bakers Association is on the track of the things Bakerydom must learn to receive its future salvation should go on down to Indianapolis.

There two groups of bakers went each its separate way. When the break came it was a decision as to whether the people wanted the lowest-price loaf of bread they could buy, or wanted the best bread they could buy.

On one side bakers went in for the cheapest loaf they could make. They sold it at 4½ cent wholesale. At the time of the break to follow the two rival principles of QUALITY or PRICE, two large bakers in Indianapolis sold about an equal amount of bread.

The lower one dropped the price the more Alex Taggart busied himself to find the IDEAL QUALITY LOAF. He maintained a price that gave him the money to search with. More than that he came to the American Institute and absorbed all its knowledge. He became one of our chief supporters.

Result? Figures compiled by a group of bakers with whom Taggart had nothing whatever to do, indicated that Taggart was selling FIVE QUALITY LOAVES AT A FAIR PRICE to every single loaf that the chief rival could sell at 4½ cents per loaf. This was only about two-thirds of the Taggart price.

Grocers, who it was thought would "come a running" for the cheap loaf, refused to have anything to do with it, for the simple reason that their customers would have little to do with it.

A visit to Indianapolis proved to the writer a very instructive lesson in what can be done with QUALITY baking, and

how an interested follower of the American Institute learned how to do it.

I found three different bakers, all strangers to the American Association and the American Institute, were trying to "get the Taggart quality." How? One thought it lay in leaf lard instead of vegetable shortening. He had changed his ingredients accordingly. He got nowhere.

Another thought it lay in the Corby High Speed Mixer and was making daily visits to his bakers to obtain credit enough to install "Taggart Equipment" as the only way to get the QUALITY loaf. Still another thought the secret lay in the milk used in the loaf and had ordered a liberal supply of milk put in.

All were guessing in the dark, of course, and there was much opportunity for the sophisticated QUALITY BAKER TO LAUGH at their guessed-up ideas.

The Drive From Within

President William Korn is a baker who believes the baking industry's members should do things for themselves. He wants his administration to rest on reports of active committees.

So for this membership drive from within he scorned the idea of hired solicitors and salesmen. Instead he demanded service from within the industry.

To take supreme command he chose William Muller, of Muskegon, a young baker full of new ideas and a sense of the need for the association to grow.

Under Chairman Muller he provided that a drive should be started from within each region now served by a Governor. The Governors were to serve as regional chairmen and under the regional chairmen, state chairmen and local community chairmen were to be chosen from those willing to serve.

It was a method entailing hardship on

busy men but nearly all saw it as a chance to help their industry.

Personnel of the Drive

Region No. 1.—Chairmen, A. H. Hathaway, Cambridge, Mass., and C. O. Swanson; aided by State Chairmen J. H. Nissen, Portland, Me., Andrew Weber, Laconia, N. H., Frank Eighme, Providence, R. I., George C. West, White River Junction, Vt.

Region No. 2.—Chairman, F. H. Stephens, New York City, N. Y.; aided by State Chairmen Richard Meyer, Patterson, N. J., Frank P. Hill, New York City, N. Y., Paul H. Helms, Buffalo, N. Y., Fred C. Haller, Pittsburgh, Pa., J. B. Gould, Hazleton, Pa., L. J. Schumaker, Philadelphia, Pa.

Region No. 3.—Chairman, Gordon Smith, Mobile, Ala.; aided by State Chairmen T. A. McGough, Birmingham, Ala., Byron C. Dorsey, Jacksonville, Fla., B. J. Pollman, Meridian, Miss., W. N. Craig, Columbus, Ga., L. Vories, New Orleans, La., James A. Winkelman, Memphis, Tenn.

Region No. 4.—Chairman, Glenn O. Garber, Frederick, Md.; aided by State Chairmen M. S. St. John, Charleston, W. Va., W. S. Corby, Richmond, Va., Geo. F. Huber, Jr., Wilmington, Del., William H. Shafer, Cincinnati, Ohio.

Region No. 5.—Chairman, I. K. Russell, Chicago, Ill.; aided by State Chairmen J. W. Hines, Chicago, Ill., C. P. Ehlers, Indianapolis, Ind., I. William Miller, Louisville, Ky., William Muller, Muskegon, Mich., Matt. H. Carpenter, Milwaukee, Wis., J. H. Phipps, Eau Claire, Wis.

Region No. 6.—Chairman, L. F. Bolser, Minneapolis, Minn.; aided by State Chairmen J. J. Regan, Minneapolis, Minn., Harry Howland, Fargo, N. D., Edward H. Swander, Rapid City, S. D.

Region No. 7.—Chairman, P. F. Petersen, Omaha, Neb.; aided by State Chairmen C. F. Alstadt, Waterloo, Iowa, Carl D. Wilke, Beatrice, Neb.

Region No. 8.—Chairman, Roy L. Nafziger, Kansas City, Mo.; aided by State Chairmen Paul Sartorius, Wichita, Kans., John Becker, St. Louis, Mo.

Region No. 9.—Chairman, Henry Stude, Houston, Tex.; aided by State Chairmen H. J. Richter, San Antonio, Tex., Charles Meyer, Little Rock, Ark., Otto Schmidt, Oklahoma City, Okla.

Region No. 10.—Chairman, I. Z. Ettenson, Denver, Colo.; aided by State Chairmen S. A. Balling, Albuquerque, N. Mex., George Mueller, Salt Lake City, Utah.

Region No. 11.—Chairman, W. P. Matthaei, Tacoma, Wash.; aided by State Chairmen Edward O'Connell, Great Falls, Mont., H. H. Haynes, Portland, Ore., E. I. Bradley, Spokane, Wash.

Region No. 12.—Chairman, R. R. Beamish, Los Angeles, Cal.; aided by State Chairmen R. J. Workman, San Francisco, Cal., George Roberts, El Paso, Texas.

With Clear Vision

WITHOUT VISION," said a good old man of the Bible, "the people perish." And we might amend it in the baking industry to read that, "without vision the bakers will never really marshal their forces and march together to build up a mighty industry out of the providers of the people's Staff of Life.

As one by one the bakers come upon the trail where thousands soon will follow, there is here and there a voice raised full of the real vision of our tasks.

"I am looking forward to the Atlanta convention the last of April," writes Frank H. Condon of the Condon Baking Co., Charleston, S. C. "It is well we have an association to ward off attacks

on us and to protect the American bakers' interests. The work done in the matter of meat posters has aroused to action the bakers of the country; especially has it been helpful in turning our attention to adopting some slogan that could be Nationally used. Such slogans as **SAVE THE SURFACE, SAY IT WITH FLOWERS, GIFTS THAT LAST**, have been successfully used by paint manufacturers, florists, and jewelers throughout the country. **BREAD IS YOUR BEST FOOD. EAT MORE OF IT.** Such was the slogan Fleischmann used and his advertisements favoring more bread consumption were very successful; surely some such National advertising ought to be affected some day by our national association. **BREAD IS THE BEST AND CHEAPEST FOOD** is a rather good slogan but I am sorry it almost follows the slogan used by the Fleischmann Company verbatim; perhaps it will prove a good one or again by some chance we may come across one that will prove a winner.

"At all events, when the bakers begin to think about questions affecting their industry, something worth while is bound to result."

Improving Baked Goods

REGARDING the sanitary inspection of bakeshops,—they are placed under the Department of Labor and Industry in Pennsylvania, but all bread, pastry and the like sold from bakeshops are subject to the food law. We do not get them all, but we get all we can of those who use synthetic substitutes for natural foods.

The baking industry is a great industry. Your "Baking Technology" can do much to discourage imitation products being used in pastry and the like.

—From a letter of James Foust, Director, Bureau of Foods, Pennsylvania Department of Agriculture.

Quality Bakers of America

*Why They Entered the Field And What Those in the Organization
Hope to Accomplish in Bakerydom*

By IVAN B. NORDHEM

Secretary, the Quality Bakers of America

WHEN any new group of bakers becomes an organized entity in the World of Bakerydom it is better for every baker to know just what it is about than to be compelled to guess. If he does guess he may guess wrong, as has often happened. Therefore, in the same way that it seeks to test and tell about all newly invented machinery and newly introduced supplies for the baking industry, Baking Technology has invited Ivan B. Nordhem to tell about the newly organized Quality Bakers.

The first we heard of them, they were supposed to be a "Rotarian group bent upon carrying out Rotarian principles in their bakeries."

A glance at the list of directors indicates that they have chosen famously successful bakers, not only from the standpoint of business success but from the standpoint of Sanitary Success and Quality Success.

The principles of business conduct of such men as Gordon Smith, Frank Eighme, A. Chewning, and Raymond Stritzinger are so well known to the Editor of Baking Technology that to doubt their sincerity and constructive purposes is impossible. Just before we received this article from Ivan B. Nordhem we saw a sweet-goods bakery on which dirt and cake-and-bread crumbs had made a layer-cake formation four inches above the floor. The floor had obviously not been cleaned in years. I. L. Miller, food and drug inspector for Indiana, closed the bakery on the day we saw it. And fights

against that kind of a bakery will benefit all, most of all the very baker who thus becomes aware of what is expected of him.

Announcing its program for services to selected wholesale bakers and the consuming public, based upon ideals that are both practical and in keeping with the present progressive times, the Quality Bakers of America, with a membership of non-competitive bakers extending all over the country, has stepped forward to point the way to a new day in the industry.

The movement is the greatest modern development in the baking industry, inasmuch as it provides for the first time a non-competitive association and an open forum for full discussion of all the matters that pertain to better standards, whether it be in the materials, selling methods or general baking practices. The organization was perfected last November and began operations the first of the present year with headquarters at 80 West 40th Street, New York City.

Objects of Organization

Among the objects for which the membership of the Quality Bakers of America have banded together are:

To maintain a clearing house for the interchange of ideas among members.

To make possible conferences between members who are independent and non-competitive, where all their problems can be taken up for general discussion.

To maintain an organization of experts in various lines who will render advisory service to members in every department of their business.

To give members the added strength of co-operating with other members along mutual lines **WITHOUT IN ANY WAY IMPAIRING EACH MEMBER'S INDEPENDENCE OF MANAGEMENT, CONTROL, ETC.**

To make possible greater economies through actual savings.

To assist members to turn out the best possible loaf of bread.

To be of practical assistance to members in order to effect greater economies and efficiency and thereby greater profits.

Departments Maintained

The bureau of the Quality Bakers of America maintains a Production Service Department, an Advertising Department, a Sales Promotion Department and a Reference and Investigation Department. Added to these departments, the bureau will afford legal advisory service, cost comparison service and any special services which may be demanded of it by a member.

Kinds of Service

The Production Service Department of the Bureau will render the following services:

To maintain bread inspection and scoring service.

To offer advice, suggestions and co-operation in order to assist the members in turning out the best quality of bread.

To give advice, suggestions and co-operation on questions of machinery, equipment, shop efficiency, baking forms and architectural matters.

To furnish members from time to time standards of analysis of new flour crops; also standards of analysis of other bread ingredients, upon request.

A member of the Production Service Department to visit members from time to time, etc.

The Advertising Department of the bureau will give the following services:

To create and assemble advertising ideas for members.

To co-operate with Members' local advertising agency, where such is maintained.

To pass upon quality and costs of advertising campaigns on the market in order that the members may secure advertising that will bring results at lowest cost.

To be in a position to effect collective buying of advertising materials to effect savings for members, etc.

The Sales Promotion Department of the bureau is organized:

To create and assemble selling plans and ideas for members.

To get up plans for sales contests among salesmen, etc.

Cost Figures Exchanges

The Cost Comparison Service is planned to give valuable assistance to members of the Quality Bakers of America.

Facilities will be offered for the exchange of comparative cost reports among members. This service is not designed to in any manner interfere with or replace the work accountants are now doing for members, but in view of the many advantages that are obvious as a result of interchanging cost information of the various departments and items between plants this service strives to assist the members in standardizing their accounting methods and records to make such comparative cost reports practical.

All departments are under the supervision of experts of many years experience in baking who have been chosen by the membership for their ability in their

various lines. The officers and executive committee of the Quality Bakers of America are announced as follows: Frank Eighme, President, Grocers' Baking Company, Providence, R. I.; Gordon Smith, Vice-President, Smith's Bakery, Mobile, Ala.; A. Chewning, Treasurer, Lynchburg Steam Bakery, Inc., Lynchburg, Va.; Raymond B. Stritzinger of Stritzinger's Bakery, Norristown, Pa., Ivan B. Nordhem, Secretary.

Ivan Nordhem's Part

The Bureau is in charge of Ivan B. Nordhem, general manager; E. B. Nicolait, head of Production Service Department; William Grimm, field manager, and others equally well-known in the industry.

Membership in the Quality Bakers of America is by invitation only. Before a baker becomes a member it is necessary for him to be invited by a member. No baker is invited unless, after careful investigation, he is found to be desirable and approved by the Executive Committee.

The field in which the movement is progressing represents the independent bakers who have the vision to see the benefits of co-operation along mutual lines between non-competitive bakers.

Overmoist Flour Seized

THE bakers are not the only ones interested in water-saturated flour. Four officials of the U. S. Bureau of Chemistry spent a month taking samples of flour offered for sale in San Francisco. They spent another seizing shipments and making citations. In all they seized ten shipments of flour in transit and made twelve citations. The overmoist flour was warehoused and additional flour put into each bag to make up for the water carried in excess of the legal percentage. Most of the flour carried 15 per cent of moisture.

From the Ground Up

I REALLY believe that any number of things can be accomplished through organization if the organization is built upon a solid foundation. The possibilities of increasing the sale of bakers bread and affiliating our industry with other industries can be accomplished only after we have become organized within our own ranks.

I believe I know whereof I speak. Upon being elected President of the Nebraska Association I started a campaign to increase the knowledge of the quality of bakers' bread. I found many obstacles that will have to be surmounted. The chief one is lack of organization within our own state. We did—at our last state convention—take one step which will be a wonderful help, once we get it in motion.

We subdivided our state into six districts, and at the head of each district there is a chairman who is vice-president in the State organization. The regular officers, together with these vice-presidents, form the Executive Committee. I am sure that having these men throughout the state sit in at our executive committee meetings, carrying back the thoughts which the state organization has in mind to their own districts, will be a wonderful help. My own idea is that our National Association should be pyramided up from the local and state associations, the National being the pinnacle of the structure.

—Carl D. Wilke.

Said Along the Way

There is much in Baking Technology that I do not want to miss and I would not break my file for worlds.

J. C. CONSODINE,

The J. C. Consodine Co., Indianapolis, Ind.

Secy. Hoover Meets Bakers

*Plans with National Association Members and Public Officials
on Industry's Great Future*

"It's an outrage the way these chain stores sell sugar and bread below the cost of production in order to make them serve as a come-on. We have got to find a way to stop it.

—HERBERT HOOVER, Secretary of Commerce, in an interview with Dr. H. E. Barnard, business manager of the American Bakers Association, and interested bakers, at Washington, D. C.

IF ANY baker in America ever doubted his returns from helping to build up a central association, whose director should be able to represent the industry before the world, this baker should have sat in at four conferences in the week of March 7th to 14th.

These conferences were in New York and Washington.

Present at all four was Herbert Hoover, Secretary of Commerce, and bakers from several of the eastern states. The problems taken up every time were the problems that beset every nook and corner of the baking industry.

One day it was the chain stores, that disturb public faith in the baking industries by selling their products far below cost, to people who do not know that these products are used as "come-on bait."

Another day it was the problem of nutrition, and the great role a greater loaf of American-made bread is going to play in building a greater and a sturdier American race of people.

At one of these conferences bakers saw famous chemists, noted statesmen, hard-working public officials all cheer together at a conception outlined to them by Secretary Hoover of the role of the baking industry in America's future.

There was no shaking of any finger of scorn at the industry. There was no threat of "do this" or you will be hauled in.

There was a picture drawn of millions of American children EIGHTY PER CENT OF WHOM WERE BORN PERFECT PHYSICALLY.

Then there was another picture of millions of American boys and girls fifteen years of age,—EIGHTY PER CENT OF WHOM HAD DEVELOPED SOME DEFECT.

Added to this, as Secretary Hoover proceeded with his story, was a picture of the baking industry, so perfecting a QUALITY LOAF that it would insure these millions of children against malnutrition defects and would give in a milk-rich quality a food that make them at fifteen just as perfect as they came newborn into the world.

With this sketch of our National duties and our National opportunities Mr. Secretary Hoover outlined the work of the American Child Health Association, of which he is President.

For the baking industry he declared that it must organize Nationally and must be supported in its organization, and protected also. He urged its leaders to send their spokesman to him with any and every problem besetting the industry.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

Published by the
AMERICAN INSTITUTE OF BAKING
1135 Fullerton Ave., Chicago

Entered in the post-office at Chicago, Illinois, as second-class matter, under the act of August 24, 1912.

Price, Fifty Cents a Number; Five Dollars a Year.

MARCH 15, 1923

Halved—Will It Double?

Our National Convention halved the dues for 1923. Will halving the dues double the membership, and thus stimulate the spirit of share-and-share-alike in both burdens and benefits?

Time to Come In

NO time ever was like the present for the bakers of our country as a whole to make their National association represent our country as a whole.

Once it was all right for New England to step out in a body when a convention did not vote to go up New England way, but New England learned there was work to do that New England could not do alone. A newer day brought New England strongly into the National fold, with men like Hathaway, Swanson, Eighme, Dexter, and a score of other earnest workers voicing the needs of Nationalism in outlook and effort.

Once it did not matter so much that the Far West was too far away, and that its resident bakers saw little that could be done for them from a National headquarters. But they learned how the chain store fights and tariff fights and express rate fights affect them all alike, and they saw the vision of a greater American Association as the one way out for Modern Bakerydom.

Leaders arose in the Far West who have been pouring in upon us a stream of new memberships. They are the modern bakers of the Great West making its Quality bread.

Similarly in the Middle West the new call goes out with a new voice and new strength. When some one baker, prominent in the Association, proved how human he was by getting into a perfectly human row with the human beings around him, it was once the fashion for everybody to stand up "on his hind legs" and unanimously resign. That day has passed,—the day of a conception of the American Association as a police force having power to punish anybody that any other member does not happen to like. The newer vision sees the American Association as a center of education and research that teach the labor of the Newer Day to those to whom the future belongs by right of their service to it.

What Can We Do?

WHAT can the American Association do if the bakers really join it in force?

There lies ahead all the unexplored regions of our world of yeast and flour and shortenings. Every day new things are found out about the Quality Loaf—new pride of the baking industry.

There lies ahead the great task of bringing the public into a new relationship to the baking industry—to give it the picture of the changed days and the changed ways.

There lie ahead the battles in Washington where we have to draw up and consolidate all positions won by our skirmish lines.

In more definite ways there are the tasks of developing our School of Baking, and turning into the industry a larger

stream of trained, diplomaed young men who will have a fresh, first-hand knowledge of the best phases of the most modern bakery developments.

There is also the task of watching the channels of publicity and seeing that the bacteria of ignorance and venom do not run in them any longer than possible. For a year past no question has been asked about the baking industry by any editor, either in his paper, or by letter to the American Institute, that has not been immediately answered.

No opportunity has been missed to give out to teachers and the public the facts about Modern Baking and how different it is from the conception they most usually have in mind.

Coming at It "Even Stephen"

PIONEERS in every line, no less in ours than in the raisin industry and the orange industry where the burden of fighting through to success fell upon a slender group alone, always carry the first line of battle.

Then comes the day of consolidation and entrenchment to keep what has been won. Gloriously has the pioneer spirit reigned in these headquarters of the American Bakers Association and the American Institute of Baking.

We who have been privileged to be here have seen the dream of a Service Laboratory grow and mature until samples were flowing in in great number and it became almost self supporting while it fed out new knowledge of Quality Loaves.

There is a principle all folks love to see in action. It is the principle of "Even Stephen"—equal opportunity, equal availability of results, equal sharing of the expense of keeping up the great machine that will create a new day in our industry.

Five hundred more members by May 1st—that will be followed by 1,000 new members by May 1st, 1924, and that in turn will be followed by service to the Industry now but little dreamed of.

Are the Dues High?

DOES any baker see in \$25 per oven a rate of dues that embarrasses him? The American Association will never be the great association it has a right to be until the dues are so low that every baker feels he can afford to join.

When the dues were \$52 per oven per year many members resigned because they were too high. If many more had joined instead of resigning it would have been possible to lower them more rapidly. The dues are now cut in half. A doubled membership is essential to keeping up our minimum National budget of \$70,000. A quadrupled membership will mean another halving of the dues when that goal is achieved. Every baker who now joins the American Association is working thereby to lower his dues when enough of his fellows follow him in.

To a Poet

GEORGE AMENT, editor of the "Retail Baker," a co-operatively owned paper published in the interest of manufacturing retail bakers, is something more than an editor betimes. He took pen in hand one day and indited a pleasant little poem about a child and a slice of bread. It was a good poem. Some other magazine reprinted it, and as George had not signed it, we mistook it to be a contribution to the paper from which we "lifted" it into Baking Technology. We gave due credit—but where it was not due. We hail you, George, as poet and editor, as well.

Bread Crumbs and Bacteria

*Report of a Study of Sanitary Conditions in the Handling
of Baked Products by Grocers*

By HAROLD E. TURLEY

Bacteriologist, American Institute of Baking

THIS article is a narrative of an investigation made in bakeries, in bakery wagons, in bread boxes, which stand in front of grocery stores and in the grocery stores themselves where bread is exposed for sale.

It is well known that in all of these processes of "merchandising" bread there may be a certain falling of crumbs that are likely to lay in bread receptacles.

If bakers knew that bread refuse collections are likely sources of infection that can spread disease through the whole bakery is there a baker anywhere who would allow them to accumulate in any part of his shop?

Similarly if the grocer looked upon bread refuse as a source of nutrition for the invisible spores and bacteria of the air that do so much damage to foods on which they eat, would they ever be lax as they now sometimes are? And would bread boxes be looked upon in just the light they are often now regarded?

The world only began to learn the rudiments of sanitary knowledge within the past half century.

The world's greatest teacher of this knowledge—the man who cured the black plague and made our cities immune from it; the man who cured child-birth fever, splenic fever, hydrophobia,—gained the open sesame to all these contributions to human welfare in a laboratory where his real work was studying yeast. And he controlled all other bacteria by the processes of controlling yeast—applying the principle the baker applies when he bakes

the dough to kill the beneficial yeasts before they have eaten up all the sugar and have soured the dough.

There is a new advance to be made in human knowledge by following through along the lines of bread crumbs and stale loaves of bread. The housewife can apply it, too, in her own home by a more scrupulous cleanliness in the kitchen bread box. Mr. Turley here tells what he found along the bread-sales route, both as to stale crumbs and refuse.

The fact that stale bread that has been handled many times in an unclean way, enters the human stomach, prompted the writer to undertake a study of the micro-organisms which occur on the bread by the time that it has been returned to the bakery.

A survey was made in Chicago of insanitary grocery stores, those kept moderately clean and those that were sanitary in every respect. At many grocery stores the bread is delivered at a very early hour, before the grocery is opened and the bread deposited in a wooden box in front of the store. Although the bread containers were usually made of tongue and grooved boards, elevated by legs, above the ground and covered with a water tight lid, it was unusual to find one that was dust proof even when locked. Most of the bread boxes examined had a layer of old crumbs and dirt an inch thick in the bottom of the box. This was especially true of the grocery stores in the poorer sections of the city.

The bread is removed from the box and is placed in the window, on the counter or in the bread case of the store. It was just in the poorer sections of the city where the grocers had placed their bread in the window in direct violation of both state and city sanitary laws. Bread was found lying on counters in all classes of

of the stales have been placed in other grocery stores as fresh bread.

A number of bakeries were visited where "stales" were returned. In some instances the bread was tossed in a room or a corner on the concrete floor, in others it was tossed in especially constructed bins and in one instance the stales were

Grocery No.	Place where plate was exposed and time of exposure	Colonies of mold	Colonies of yeast	Colonies of bacteria
1	Bread box in front of the grocery. Exposed one minute.....	17	9	327
2	Plate exposed one minute in bread box in front of the grocery while dust was disturbed.....	5	11	1023
4	Plate exposed on the counter for one minute	2	1	125
7	Plate exposed one minute in a bread case while air was still.....	1	none	17
8	Plate exposed one min. in the window where bread was placed for sale..	9	12	89
13	Plate exposed one minute in the bread case while air was disturbed.....	9	7	121
15	Room near bread while air was still. One minute exposure.....	11	3	201
16	Plate exposed near bread on counter, for one minute.....	1	none	12
18	Plate exposed in bread box for one minute while air was disturbed...	13	21	487
21	Plate exposed near bread on counter for one minute.....	none	1	10
25	Plate exposed one minute in bread box while air was disturbed.....	5	24	1233
23	Plate exposed one minute near bread case	1	none	7

stores. Insanitary bread cases were found mostly in the poorer sections of the city while the more sanitary ones were found in grocery stores located in districts populated with the middle to wealthy class of people.

The unsold bread, the "stales" were either taken away from the store by the delivery man, or collected from the bread box in front of the store. Many food officials have found at times that some

placed on racks. Of the wrapped bread that had been returned as stales I would estimate that ninety per cent of the wrappers had been broken.

Micro-organisms Present

The following biological investigations were made with a view of finding out the number and kinds of micro-organisms that occurred in bread-holding receptacles and of the conditions surrounding

the bread; (1) Sanitary conditions of the air that surrounded the bread during the process of handling; (2) Study of the receptacles where the bread was kept; study of the micro-organisms that occurred on returned stales as they were collected from the grocery store or from the bakery.

In order to arrive at the sanitary condition of the air, plates of wort agar and potato dextrose agar were exposed at certain intervals of time and the lids replaced on the dishes. Agar is a seaweed that after boiling and allowing to cool will set in the form of a jelly. Wort or potato juice is added as food material for any micro-organisms that would happen to light on the plate. Of course bacteria yeasts and mold spores are so small that it requires a high powered microscope to see them. However, each organism that develops will develop into what is known as a colony that is visible to the naked eye.

Plates were exposed in thirty-three grocery stores in various places. The results of all the exposures made would make the report too lengthy so a representative list is given in the accompanying table:

Some dirt particles and crumbs were collected from several boxes where stales were deposited. These were collected in a sterile container. One tenth gram of this material was dropped in 200 cc. of sterile water. Cultures were made from this water with a development of over 300,000,000 bacteria per gram of material.

In The Stales Room

Plates of culture media were exposed in a room at a bakery where stales were kept. The plates were exposed one minute in all cases. A plate exposed near the wrapping machine, before the "stale" room was entered, developed 2 mold and

12 bacterial colonies. A plate exposed in the stale room before the air was disturbed developed 7 molds and 32 colonies of bacteria. A minute later three armloads of bread (none of them moldy) were tossed in the room and a plate was exposed which developed 36 colonies of mold and 934 colonies of bacteria. A few minutes later a plate was again exposed near the wrapping machine and this time it developed 16 colonies of mold and 137 colonies of bacteria. There was no moldy bread in the stale room at the time of this experiment. Had any of the loaves that were tossed in the room been moldy the plates would have shown a far greater number of mold colonies than the plates in this experiment. It was reported in a previous number of *Baking Technology* what one loaf of moldy bread would do to contaminate a bakery. From the standpoint of bakery sanitation it can be seen from the above experiments that it is a bad practice to return "stales" in the bakery.

Having studied the sanitary conditions of the places where "stales" are kept it is important to know what micro-organisms are found on the refuse from stale bread itself. Crumbs were collected in paper bags and from the following places: bread cases, bread boxes, counters and windows of grocery stores, and from the storage space in the bakery. A procedure for the determination of the kinds of organisms occurring on crumbs is given as follows: a damp sterile cotton swab was rubbed over six square inches of surface on the side of the loaf and the swab immediately inserted in 100 cc. of sterile distilled water. The water with the swab was shaken and both 1 cc. and .1 cc. portions of the water removed and deposited in tubes of culture media which had been held just at the melting point. The tubes with the inoculated culture were shaken

several times and their contents poured under sterile conditions into a sterile dish (petri) with a cover. The plates were held 48 hours at temperatures of 30° and 37° centigrade. The above procedure applies to two kinds of culture media used, namely—Endo's agar and a triple sugar potato agar. In order to insure the growth of organisms found in and on the human body, a culture medium was made using agar and sterile human blood. For this medium the swab was rubbed over the surface of the agar after it had been rubbed over the surface of the bread.

Mold Types Present

The molds that were found on the returned stales are given as follows: *Rhizopus nigricans* (whiskers), *Aspergillus niger* (black mold), various blue molds (*Penicillium*), several green molds known by the group name of *Aspergillus*, a dark green to black mold known as *Alternaria* and a few infections of a mold known as *Fusarium*.

Many plates produced large numbers of several species of yeasts. Time did not permit a differentiation of species.

In speaking of the bacteria that were found on the refuse it is necessary that the scientific names be used in order to give them their full import. The blood agar plates produced such pus boils and abscess forming bacteria as *Staphylococcus aureus* and *Staphylococcus albus*; several species of *Streptococci*, which are associated with inflammatory conditions in man, and one colony of a haemolytic streptococcus was found that is very dangerous to man. The blood agar plates also produced some bacteria that are associated with respiratory infections such as *Micrococcus catarrhalis* and *Micrococcus tetragenus*.

The plates of the triple sugar potato

agar revealed a large number of bacteria that are associated with putrefaction.

The plates of Endo's agar produced large numbers of the *B. Coli* group of bacteria. The American Public Health Association uses the *B. Coli* group as an indicator of pollution and filth and of harmful bacteria.

Summary

From the foregoing discussion it can be readily seen that the return of "stales" is a very insanitary practice from every standpoint, particularly from the standpoint of bringing infections into the bakery on crushed and broken loaves from which the wrappers are often torn, for as I said before the "stale" has been handled and rehandled under very insanitary conditions. The improving of these conditions is a matter on which the bakers, the grocers and the public can all cooperate to advantage.

World Wheat Crop Short

THE Department of Commerce, Washington, D. C. sends out a summary of the world's breadstuffs outlook, which suggests America will be called on heavily to supply a world shortage in wheat.

The report indicates that Italy will require 2½ millions tons of wheat to make up the 1922 shortage, Czechoslovakia, 15,000,000 bushels, Holland, 600,000 tons. In Dresden, it is stated, Municipal Kitchens furnish a noonday meal to working people of small means.

It was very interesting and instructive for me to see your well equipped laboratories as well as your school of baking.

I am very glad to learn that you have such a fine Institute of Baking for service to human society is surely a pride to your countrymen.

I hope your Association will be successful in future.

—S. Izume.

100 Per Cent Absorption

WILL the diplomaed baker win his way in the new industry that everywhere is replacing the older handcraft methods? So far the graduates of the American Institute of Baking are meeting with 100 per cent of absorption into the World of Bakerydom. One of them after a year in shop work has become general manager of a first class bread factory at a tripled salary. This means that the plant owner saw that there was much to be won through real scientific control, operated by a man thoroughly trained to know his business all the way through.

Do you want to know whether a baking course pays? If so look up the nearest graduate to you. Here are the locations of some of those who have become the American Institute's first alumni:

Armond Hecht wanted to add a sweet goods course to his bread course and went from our Institute to the Dunwoody Institute at Minneapolis.

Alfonso Velasco, who came from Mexico City to learn baking for the benefit of his father's Mexico City bakery, has also decided to round out his experience with a cake course at Dunwoody.

Jos. Weil found work awaiting him, with plenty to do at the Banner Grocery Baking Co., Cincinnati.

Herman Albers left school for Omaha where he is to be found in the plant of the Jay Burns Baking Co.

H. S. Long had had an extended baking experience before he attended the Institute course. He is now applying his new knowledge plus what he formerly had obtained, at the Liberty Baking Co., owned by Sam S. Watters, a veteran organizer of the Western Pennsylvania Association, and a veteran supporter of the National Association.

Harry Stein has given over experimental work here to do the same work on a larger scale for the Perfection Biscuit Co., of Fort Wayne.

J. J. Meninga returned to the Engel Baking Co., of Paw Paw, Michigan.

The Far South obtained one of our graduates when Harry Vories went to Louisiana to work in the plant of the General Baking Co., at New Orleans.

Fred R. Deininger will be found at the Rochester plant of the General Baking Co.

Leslie Weber, sent here by the Fleischmann Co., following a plan that others of the Allied Trades may adopt, is at that company's plant in St. Louis.

Olaf Peterson, in the midst of his course, received a telegram that his baking plant in Omaha was having serious trouble. He went home, cured it speedily, and returned to finish his work. He is now at the Peterson & Pegau plant in Omaha.

Thus the list grows. We now have graduate bakers in almost every state in the Union. In Spokane, for instance, Harry Fulton is usefully at work at the Federal Bakeries, and the Matthaai Bread Co., of Tacoma, has sent us a student who will soon be back in the Matthaai plant.

Fine Co-operation

WHEN the baking industry really comes into its own it will be through the co-operation of supplies men, machinery men, flour men, cake bakers, cracker bakers, and all of the related industries through which the baking industry naturally asserts itself.

We have just observed some Larrabee flour advertisements on three-sheet bill boards. "BUY BAKER'S BREAD" in large letters suggested that this firm had

found home-baking on the decline, and had struck the new key note of co-operative fellowship.

Just now comes to hand a letter from W. H. Stokes, sales manager of the Stokes Milling Co., of Watertown, S. D., which splendidly expresses this "pull together" policy for his company.

"We wish to thank you," he writes to Dr. Barnard, Secretary of the American Bakers Association, "for the information you sent us about the American Institute. We believe that our opinion is shared by other mills that your Institute is of the greatest benefit to not only the Baking industry but to the allied industries.

"We wish that you would tell the editor of Baking Technology that we find his bulletin intensely interesting and instructive.

"We happen to have in storage in Chicago five sacks of old wheat Garland. We suggest that if the flour is still in good condition to bake up one dough from this old wheat Garland and compare its baking qualities with the flour made of this year's crop."

Bread Below Cost

A MATTER that the Federal Trade Commission is sure to touch upon sooner or later is the business of selling bread below cost to lure customers into the presence of high-profit commodities such as coffee, tea, catsup, and the host of household necessities the chain store proprietor hopes the housewife will take out along with her bread.

The Commission has just taken up the charge that a large glucose manufacturer sells its basic product to others and then makes a finished product itself which it sells with a "guarantee against price declines." The "guarantee" works, ac-

cording to complaint before the commission, in such a manner that whenever a competing concern offers its finished product at a lower price the purchaser can obtain that much of a rebate from the selling company. Complainants in this case seek to show that the "rebate system" works to force them out of existence. No less does the system of selling bread below cost tend to hand the bakery business a crutch or make it a lean-to on other industries.

The public more than any other interest would be harmed by such a development in the long run, and the Federal Trade Commission is showing a very lively interest in all such cases.

The trouble so far is that the bakeries selling below cost make their bread and sell it all within one state. Even where the bread has crossed a state line the buyer has been able to show it came into his possession within the state where he sold it. For this reason all industries whose goods are standard staples are tending to co-operate in obtaining laws for State commissions similar to Federal Trade Commission.

In Dent Harrison's Bakery

HOW many American bakers ever experienced a condition now prevailing in Montreal? On arriving at the bakery one evening Mr. Harrison found himself shut out,—not by locks but by the great throng of people pressing to get in. The people had come from far and wide to see one of the marvels of our day,—a "revolutionary oven" capable of baking 3½ tons of dough per hour. This was 5,000 loaves or the output of 7,500 home-working women.

I find Baking Technology to be of great value.
—L. B. Allyn, Westfield Testing and
Research Laboratory, Westfield, Mass.

In An Open Shop

HOW much was the revolt of American industry against the "closed shop" of unionism a revolt against good hours, good wages, and healthful working conditions, as enforced by union business agents, and how much was it a revolt against insufferable autoeracy imposed by an ignorant and officious, and often a graft-levying, labor boss?

In New York the notorious Brindell, now in Sing-Sing, would let a building get up to twenty-three stories with one more to go. Then he would demand of the owner "a berry a floor." That meant, in this building boss' lingo, "\$1,000 a floor." If this personal graft was not forthcoming then Brindell would "strike" just four workmen. They were the four who operated the hoisting machines, and with these hoisting engineers on strike it would be impossible to finish the building. It would become a case of "pay or quit."

Graft levies on the milk companies of New York and even an impudent demand by a business agent that Borden's buy its cans of a certain designated concern, led to the turning of that industry from "closed" to "open" shop. The strike "lasted fast" as the bullying of the union bosses had sickened most of the much pilloried union members. They were almost as glad as their employers to unload the incubus of war-made labor bullies.

It was common for labor bosses not only to levy huge graft demands upon employers but even for them to declare a workman's union card defective, and then sell him a "work card" for "\$50 down and \$10 a week while working." The money was collected by a strong-arm thug directly from the workman's pay envelope before he got hold of it at the building where he was employed. Many such thugs fled New York when the Untermeyer investigation began.

Hundreds of these "working cards" came into the hands of the present writer during the investigation of the New York Building Trades Council. All were furnished by good union workmen who had paid their union dues in addition.

A labor boss, running around in a Packard twin-six roadster, with a country home, a mountain resort, a lake-side villa, and an office building in New York in his wife's name, was the only visible evidence of where the money went to. On the new Cunard building alone his personal graft levy was shown on the evidence of the graft payments to have been \$50,000.

In the world of Bakerydom the decent baker, who wanted to grant every reasonable demand of his union workmen, found them declaring against Sunday work when this would mean no fresh bread on Monday and so a tremendous loss of business, as any woman would home-bake rather than eat Saturday bread on the following Monday. Arbitrary rules against night-baking ruined many a baker who tried to work with the unions before the revolt came on. His "late started" bread got into delivery so slowly against his competitor who was not unionized that his ledger would never come up out of the red. A unionizing leadership that refused to look at any of these problems continued to kill off its friends.

Now what shall the open-shop bakery owners do? Will some of the blinder of them give the workmen such a collection of grievances that they will rush together in a new unionism to obtain fair and grantable conditions?

Not so, we think, in plants where grievance committees are freely heard, whether formally or informally selected; where sociability and good-will and the Square Deal are the shop administration slogans.

President William Korn of the American Bakers Association, who is one of

the most "human" of bakers, sends us this statement of "Open Shop Ideals" as practised generally by industries in Los Angeles. Their moral seems to apply anywhere in Bakerdom:

Open Shop Ideals

To the Members, the Merchants and Manufacturers Association:

Through the Industrial Relations Department of this Association, Los Angeles has made great progress in constructive industrial relations—the newer philosophy in the solution of labor problems.

We are the white spot of America, booming in industry **without strikes**, leading in the construction of buildings, mainly because the majority of employers have accepted and practiced this association's policy of a square deal. To maintain these conditions and further aid in the development and prosperity of Los Angeles, we need the hearty co-operation of every employer of labor.

The usual seasonal influx of labor has already begun and consequently we may soon be confronted with a surplus of labor. With the labor market so oversupplied it is but natural that some men would rather work than remain idle and will accept a wage less than the fair economic value, and, as a direct result of such forced conditions, many men who are obliged to obtain work at a lower scale will only deliver as much as they receive. That is the natural consequence by force of common reasoning and human emotions.

Such a policy, if practiced by employers, will as a natural result greatly injure the open shop or American Plan movement and will justify the propaganda spread by organized labor, that the open shop means lower wages. It is therefore the duty of every employer to

maintain the wage schedule at as high a rate as is justified by the earning power of the employees. To take advantage of a temporary surplus of labor does not pay incidentally or permanently.

Your association urges you to help carry the gospel of a liberal, human solution of all labor problems, and you will receive a dividend more substantial by carrying out, to the fullest extent, the principles of the open shop, not alone in dollars, but in still greater development and prosperity of our own Los Angeles.

Yours very truly,

IRWIN H. RICE,
President.

Bulletin Wanted

WE HAVE had such good results from the call issued last month for missing magazines, that we have been encouraged to send out another S. O. S. signal; this time for Bulletin 2, of the American Institute of Baking, January, 1921, entitled "Methods of Analysis, Co-operative Work, Cereal Products, Wheat Flour, 1920." Our entire supply has been exhausted and if some of our readers have duplicates of this in their possession or have no special use for their copies, it would be a great help to us to receive them.

Our sincere thanks are due to Mr. J. M. Burns of Independence, Kansas, and Mr. F. L. Ward, of the Bakery Division of the Portland Flour Mills Co., Portland, Oregon, and the Davis Standard Bread Co., Los Angeles, California, for sending us copies of Bakers' Weekly and Western Baker.

We surely appreciate the detailed analysis of flour the American Institute has given us. It is the best we have ever received on any flour samples we have submitted.

—Eddy's Steam Bakery, Helena, Great Falls and Missoula, Montana.

How Hot Is a Dough?

A PRETTY acute observer of bakers and baking is John W. Burns, secretary of the Breadstuffs Council. Recently he encountered one of those willful bakers who was sure his dough room temperatures responded absolutely to his own wishes.

"I can tell without any thermometer," the baker insisted, "when I have water that is right."

Burns asked him to draw a bucket of water at 80° F. The baker did so, and a thermometer proved it to be 83° F. Even so the guess was so accurate that Burns marveled.

But he tried again. "Draw me another bucket," he suggested. This time the water was asserted to be the same temperature as the first bucket. Yet the thermometer, a tested instrument, proved it to be 13 degrees off. It was only 67° F.

And this time it was Burns' turn to laugh. "An Observer," writing to the "Retail Baker," notes that one baker believes in lard and has no use for vegetable shortenings. Another uses a thermometer and a competitor across the street will have nothing to do with a thermometer. He tells of the endless conflicts over blending, sugar, the best kind of milk, and even over salt.

What could be a better argument as to the need for a Central Institute that can really prove out all of these "prejudices" and give a decision the whole baking industry will have faith enough to accept?

The American Institute, for instance, is now testing out sugars because of the bakers' set opinion that any but coarse granulated sugars will tend to discolor the loaf. Some other sugars, costing much less, will give an identical return of sweetness. It is also testing out all forms of shortening and other ingredients.

Service at Last

WHEN Henry Stude of Houston, Texas, was asked for money with which to start building a golf course, he paid. In six months he paid again. At the end of a year he paid still once again. In the meantime he played no golf on that course. It was a hated rendezvous for scrapers and wagons and miscellaneous workmen.

At last it was announced that the course was open. And the few pioneers who had seen the work through were joined by a great multitude who never would put up a cent in the pioneer years. They would pay, at last, "when they got something right away for their money."

Mr. Stude told this story often to bakers who wanted to visualize something right in front of their noses as coming back to them AT ONCE for their American Association dues.

R. C. Moir, of "Ben's Limited," Halifax, N. S., a faithful baker, of the class of Mr. Stude, writes: "We have been members of the association for a number of years without receiving any material benefits so we were more than glad to be able to send our bread to you to be scored. We are expressing to you tonight a loaf about which we ask your candid opinion. The service which you now offer in the form of continuous bread scoring makes membership in your American Association of incalculable value."

This service could only be offered after a tremendous amount of money had been spent in obtaining a home, in opening laboratories, in building up a scientific staff. Those who saw the vision and hewed to the line of their hopes are nowhere, these days, meeting with disappointment.

They have seen the Institute of their dreams grow into being.

An End to Slurs

HAPPILY the days when fruit packers, egg producers, cream and milk dealers and others considered that "whatever was left" was good enough for manufacturers using such products, are over.

Last summer we found a dairyman advertising "fresh goods only—all other materials we sell to bakers." We asked him what bakers, and he had to admit that the "catch phrase" was not based on facts. That ended it.

The Pie Bakers are the latest to catch a phrase in a supply man's circulars and see that it is done away with. They found certain very inferior grades of packed fruit bore such labels as "Pie Filler" or "Baker's Pack."

The bakers themselves had found that QUALITY PIES made each pie sell its successor, and they found that the only way to make Quality pies was with Quality material. So they abandoned the grades made up with labels mentioning baked goods. They did more than that. They passed this resolution and sent it to every canner putting out goods for bakeries:

"Resolved, that the National Association of Wholesale Pie Bakers hereby requests that fruit canners, brokers and jobbers discontinue the use of the terms PIE FRUIT and BAKER'S PACK and all other terms now used to indicate indirectly inferiority and low grade fruit, and to apply such terms only to fruit of high quality and grade."

One fine thing about this resolution is that W. P. Hartman, of the Bureau of Foods and Standards, State of Michigan, for instance, liked its spirit so well that he personally distributed it to every Michigan canner. Furthermore he wrote a letter of thanks to James J. Regan,

secretary National Association of Pie Bakers, for calling for high grade ingredients only in bakers' pies.

A Raisin Loaf

WE are considering placing upon the market (wholesale only), a good loaf of Raisin Bread, and thereby take advantage of the National advertising that is now being done on raisins.

What sort of a formula would you suggest?

ROYAL BAKERY,
Twin Falls, Idaho.

The Royal Bakery, it appears from its letter, is one that is thoroughly alive and observant of passing opportunities. We not only sent this baker all good formulas now tested out but we will be able to forward him many more, as experiments now under way through the Fellowship fund of the Sunmaid Raisin Co., develop new data.

A Fine View Point

SOME years ago our company discontinued the baking of crackers, cakes, pies, and bread and confined its manufacturing operations to pretzels, ice cream cones and egg biscuit, with the exception of the Philadelphia plant where a whole wheat bread has been baked for a number of years. On this basis we make application for membership in the American Bakers Association.

We are members of the Biscuit and Cracker Manufacturers Association and our application is sent in to American Bakers Association because we believe it deserves the support in some degree of ALL bakers.

L. J. SCHUMAKER, President,
The American Cone and Pretzel Company,
Philadelphia, Pa.

Why Bakeries Must Be Clean

They Rank With Dairies and Ice Cream Plants in Opinion of Noted Woman Authority

By SARAH H. VANCE

IF all the women of America knew that all the bakers of America measured up to the fullest of their expectations what would not this new-born trustfulness mean in the form of new-born sales?

The expectations of women in the home, of women in public life, and of women in the clubs cannot be too highly thought of by the baker in his baking plant. The story is old, but of course it will bear repetition until every bakery is one where the proprietor feels like conducting frequent "Open House."

"I would like to respond to your invitation that I write you the story of baking machines and my faith in them," Dent Harrison of Montreal responds to an invitation of ours, "but the fact is I am too busy holding a daily open house for school teachers and students. We have hundreds here every day, looking over our new 'revolutionary oven' that bakes 5,000 loaves or three and three-fourths tons of dough per hour." Teachers' magazines overflow with stories about Dent Harrison's plant and its new gigantic oven. He had a right to install such an oven for he put in the first traveler ever installed anywhere, and so started progress towards the modern oven practice, in the largest plants.

Ours is not the only industry making fast strides toward greater sanitary perfection. Do you recall the "National Open House" campaign of the 7,500 modern laundries of the United States? They invited all the people to come to "the neighborhood laundry" and see how clean and sanitary it was!

Think of sending out such an invitation ten years ago!

Every day, in every way, modern machines are making it possible to broadcast invitations like that for every neighborhood in America where a neighborhood bakery exists. In Ogden, Utah, we encountered L. C. Mitchell of the Ogden Baking Co., showing a High School class through his immaculate shop.

Another baker, on whom we called in another western town, rather blushed and told us pointedly that he had not invited us to his bakery "on purpose." He then told a sad tale of a partner who had successfully opposed all plans for improvement in thirty years while he had seen the need "but had not fought it through." He was the oldest baker in that town—but far from the largest.

Jay Burns stood a mean and wicked flareback when he became the apostle of modern sanitation, but every day in every way his words bear their meaning home and bakers realize he was no foe of the little baker when he spoke, but a "voice in the wilderness calling for repentance" and for progress. As a minister's son he had a right to do that. By the way, William F. Ireland, the apostle of sanitation in Los Angeles, is not a minister's son but is an ex-minister himself, and John Hartley, beloved preacher of co-operation and get-alongitiveness among retailers, is to the pulpit born by rights. Good preachers all, they carry the message here set forth by the woman who watches public health conditions in Kentucky.

Cleanliness is more to be desired in milk plants, bakeries and such food establishments as produce or handle food which will not be cooked by the housewife before eating, than in a plant handling foods which will be washed and cooked by the housewife before eating.

Considering this fact, the responsibility of the baker to the customer is greatly increased and his desire to produce a saleable, palatable food should be closely linked with his desire to produce a clean and wholesome product.

The Grocer's Role

Often our larger bakers feel that their responsibility has ceased the moment their bread leaves their factory and is delivered to the retailer. This baker is losing sight of the source of his trade, the final consumer, and unless he assumes the entire responsibility of the bread that bears his name, he is shirking his greatest duty. These groceries and retailers of bread from the wholesale bakeries are the agents of the big bakery to the consumer and let us be certain and select as our agents establishments that are really fit to represent us.

Minor Violations

It is not often that we find gross violations of sanitary laws in the larger wholesale bakeries but we find those minor violations which really are dangerous to public health. It is often found that a bakery is using wholesome materials, the most modern equipment for mixing and baking and then setting their product to cool in a dust-laden room, packing it unwrapped by ignorant, dirty help, into open mesh baskets or boxes, either entirely unlined or else very improperly lined. Often the excuse offered by these bakeries for such practices is "our trade doesn't like wrapped bread."

If only the bakers, as an organization, would educate and make the consumer want wrapped bread! It is true of many other trade practices; the consumer is blamed, when in reality the consumer knows no better.

The Small Baker's Part

The sanitary conditions of the smaller retail bakeries in small towns is of even greater importance. It will perhaps be of interest to know of conditions found recently in twenty-nine bakeries in rural counties. In this inspection we found seventeen bakeries in good condition, nine bakeries in fair condition, three bakeries in poor condition. The inspection further showed that nineteen of these bakeries use the public water supply; two obtain their supply from the town pump; five have private wells; one bakery uses spring water; while thirteen of these bakeries have proper toilets connected with town sewerage system; four have open surface privies on their property close to the bakery; eight have no toilet facilities whatsoever at their bakeries; and thirteen of these bakeries have running hot water; seven use a kettle to heat water and three have no hot water supply.

Purpose of Inspections

All of our inspections are made with a view of finding existing insanitary conditions and the inspection report lists the possible violations in sanitation which might occur in a food handling establishment. On tabulating the violations found in these twenty-nine bakeries, our record shows that two had insufficient lighting; eight bakeries insanitary walls and ceiling; twelve had insanitary floors; seven had insanitary utensils, troughs or racks; two had exposed food products to dust or flies; one had exposed waste products; two had employes with unclean clothing;

five had inadequate screening or infestation of flies; four had insanitary toilets; one permitted sleeping in food establishments; two had unclean outside premises; and three had inadequate hot water supplies.

Each of these violations was and will always be a possible source of contamination of the food produced at these bakeries.

Sanitation as it relates to bakeries or any other food establishment does not and can not lay down any hard and fast rules but is only governed by the principle, **FOOD MUST BE PRODUCED AND SOLD IN SUCH A MANNER AS TO BE ALWAYS PROTECTED FROM UNWHOLESOME CONTAMINATION.** Our food sanitation laws, our association codes, our food ordinances and the rules and regulations formed under these are all framed to accomplish the purpose of supplying the consumer with clean, wholesome food.

Bakery Requirements

We might condense the requirements for a sanitary bakery as follows:

1. Clean smooth walls and ceiling and clean floors in all rooms where food is handled.
2. Proper toilet rooms, lavatories, and dressing rooms, separate from the rooms where food is handled.
3. Clean and proper machinery, utensils, etc.
4. The absence of domestic animals and vermin of all types.
5. A safe and abundant water supply.
6. Wholesome raw products.
7. Healthy and clean employes.
8. Proper disposal of waste products.
9. Complete protection of food products from time of manufacture until sale to final consumer.

A Good Baker Wanted

I AM in the market for a young man, a practical and scientific baker, married man preferred, who is an all around bread and roll man, as well as good on cakes and pastry. Can you put me in touch with such a young man who wants to grow?

A. E. ARVEDSON,
Daytime Bakeries, Danville, Ill.

Once Ellis Island gave us a steady flow of talented young men of the kind wanted. But "them days is gone forever." The rapid development of the American Institute's school, and of all other baking schools such as the Dunwoody, at Minneapolis, the Siebel at Chicago, and the Sam Goetz traveling school in sweet goods, now seems the only way out. Unfortunately all our own students, so far, have had places waiting for them from the moment of their arrival. Our "sweet goods course" is a development next in line after the opening of the general baking course. Some of our graduates have gone to Dunwoody for the sweet goods course after completing their general work here. The baking INDUSTRY, as differentiated from the old handcraft-controlled situation is still in its swaddling clothes and has hardly learned to take step at all with its OPPORTUNITIES. We hope soon to answer every letter like this with a response that will count. Hundreds of such letters seem surely in prospect for the future.

We wish to express our appreciation of Baking Technology. All copies have been brim full of interesting and valuable information. We have carefully read the issue of Nov. 15 and believe it to be the best number so far published. Our manager, August C. Junge, concurs in this indorsement of the magazine and is heartily in sympathy with the work that the association is doing.

—C. A. McDuffe, Supt. Junge Baking Co.,
Joplin, Mo.

Deluding the Public on Price

Even the Pre-War Loaf of 5 Cent Bread Was a Fraud Since It "Weighed Any Old Amount"

By C. J. KREMER

Senior Inspector of Bakeries, State of Wisconsin

WHEN two chain stores in Chicago entered a bread war to see which could undersell the other and thus create the greatest amount of public notice, the Piggly-Wiggly "knocked out Kid A&P with a zero price." Luckily both dropped so low in the first rounds of the encounter that even the newspaper editors could not claim that "bread was being sold at the prices quoted." It took the phase of a "give-away" before the first got fairly started.

The Chicago Herald-Examiner quoted C. S. Wyatt, District Manager of the Piggly-Wiggly organization as saying at the height of this unfortunate price war—unfortunate from the standpoint of the great bread industry which has to pay its way or perish—that "WE MAKE A BIG NET PROFIT (ON OUR STORE AS A WHOLE) AND WE DON'T CARE IF WE EVER GET A CENT OUT OF OUR BREAD."

There you have the Piggly-Wiggly bag of tricks laid bare. They sell handsome-profit coffee, lovely-profit tea, swell-profit catsup, and ace-high profit canned pears to housewives who are lured from their homes by the glaring advertisement of "FREE BREAD" or 2-cent bread.

The housewife pays for the bread all right but like the store owner whose traveling salesman disguised the price of an overcoat in "swollen" accounts for room rent and board, "she doesn't know it."

There are hundreds of tricks by which sensationally priced bread can be "put over" on the public to the accompani-

ment of a fanfare of newspaper publicity, given by uninformed and often not-keenly-inquiring reporters. One is to take advantage of lax law enforcement and put out a loaf of bread one or two ounces short in weight.

C. J. Kremer, a man who has served for many years as a bakery inspector in Wisconsin, exposed this trick at a hearing in Milwaukee. His words remain as true for conditions to-day as on the day he spoke. For that reason we reproduce them. Mr. Kremer was for forty years a baker. He worked in the days when \$1 a week and "something to eat" was considered "fair wages." He got such a return for his early labor. He knows the baker's world and his heart is with the little, independent baker. Of such the American Bakers Association has to have a full proportion, with a fair share of voice for their particular problems before it will ever attain its full usefulness.

On all matters where the "little baker" has feared the "big baker" Mr. Kremer has gone to war manfully on the little baker's side.

Yet where in what Mr. Kremer sets forth here is there any problem not striking the biggest and the littlest baker exactly alike? His paper is a fine human document on the essential oneness of bakers' problems that call for federation, co-operation and a marshaling of resources at one general headquarters.

I would not deny legislative bodies the power to investigate conditions under

which bread is made and sold, and to take such action as may be necessary to insure for the community good, wholesome bread at reasonable prices. I even think it is their duty to perform this public service.

Moreover, the baker who establishes a shop or a factory thereby assumes an obligation to provide for the people whom he serves the best possible bread at a price that is neither unreasonable nor excessive. He enters into a contract, not a written nor even an oral contract but one that is binding upon him nevertheless, and which he violates if he does not furnish the best bread he can or exacts an unreasonable price for it.

It would seem from the fact that this hearing has been called and from the reasons given for the call that there are those who believe that at the present time bakers are asking more for their bread than is equitable.

Under Price and Weight

One of the reasons given for calling us here is that a certain large store in this city is selling bread at six cents a loaf. I have bought several loaves in this store on different dates and I weighed them.

Some weighed 15 ounces, some less. I bought two loaves last Saturday when the store advertised "full 16 ounce loaves for 5c" and found them to weigh only 31½ ounces—both of them. I also weighed loaves bought by other persons and found none of them to weigh 16 ounces, some only weighing 14 ounces.

Under the city ordinance a loaf of bread must weigh 16 ounces and the question is but fair. Is this store permitted to violate the regulations of the city of Milwaukee with impunity and to flaunt its disregard of lawful ordinances in the face of the public? Is it commendable for these actions and to be held up as an example for bakers to emulate?

For many years I have worked for the establishment of a legal standard for bread weight, so much so that many bakers who formerly were my friends became estranged. They considered me a nuisance and to my mind the city ordinance establishing the weight of loaves at not less than 16 ounces is fair and beneficial.

Weight Withholders

In my opinion the withholding of one-half or one ounce of bread from persons who are entitled thereto and who may need it to feed hungry children is highly reprehensible. I believe it to be nothing more or less than filching that much bread from unsuspecting purchasers. Would this store accept 14 or 14½ or 15 or 15½ yards of cloth when they are entitled to 16 yards?

If any person owes them \$16 would they accept \$14.50 or \$15.00 or \$15.50 as payment in full? Yet that very thing is done by them to persons who purchase loaves of bread.

Bread As a Puppet

I believe the selling of bread to be a serious matter and that it should not be made the puppet of advertising experts. Let bread at all times and in all cases be sold at an honest price. That store or concern which sells bread—at certain times or in certain quantities—at less than a living price for the sake of a little publicity is doing an ill service to the community. Such "sales" in my opinion are against public policy.

Stores have many commodities to sell on some of which they do make a "long" profit and any loss which they might have on bread is absorbed in the sales of more profitable articles still leaving them a handsome profit.

With bakers it is different, their chief item is bread and if that shows a loss

there is no reimbursement from any other source. **It spells bankruptcy.**

The public does not correctly analyze such a situation. Their reason: The store is selling bread at say 6 cents and getting enormously rich at it—why cannot the baker do the same? **He must be a profiteer.** Thus an ill feeling is created and fostered against bakers and an honest business is beclouded with suspicion and distrust.

If any store can sell an honest loaf of bread with all its cost such as material, labor, rent and overhead properly charged against it, at a less price than a baker does, then let it sell all it can. Let it compete fairly with the bakers and the public will be benefited but dishonest, unfair competition is not a public service. It is in fact a public detriment.

Prices Must Vary

Even under honest, clean competition prices of bread will and must vary. Should we ever get a uniform price of bread I feel then there ought to be an investigation. Flour out of which good, or at least wholesome, bread may be made can be bought now for from \$8.75 to as low as \$3.75 or \$4.00. Would anyone contend that bread made out of one should sell at the price of bread made out of another? The quantities as well as the prices of other materials used in bread show nearly as great a variation. Labor costs vary.

In some shops the entire family is employed, the baker, his wife and his children. All work diligently and beyond a living do not expect much salary. Others employ high grade outside help who must be well paid. Is, under these conditions, a uniform price for bread reasonable?

All of these conditions create an earnest competition among the bakers and be-



—The Bread War as seen by the
Chicago Herald Examiner.

tween bakers who sell at wholesale and those who sell at retail. All must sell bread to make a profit or a living, and at a price that is fixed by competition. Let anyone ask more than the quality of his bread or his service warrants and his customers will drift to the next place, not far away.

Let me add that it is a common failing among small bakers to underestimate their costs and undervalue their own work and that of their families.

The Old Time Loaf

I want to say a few words as to the so-called 5c loaf of bread—"that reminds us," the ad says, "of old times." When that was on the market it weighed anywhere from 11 to 14 ounces. During the year 1917 I made an investigation and found the weight of a 6c loaf in Milwaukee to be 11 ounces; in Fond Du Lac, 11 ounces; in Madison, 12 ounces; in Oshkosh, 11 to 13 ounces; in Appleton, 11 to 13 ounces. The so-called 5c loaf was a delusion and in spite of its seeming cheapness, was an expensive proposition. If an 11 ounce loaf in 1916 and 1917 cost 6 cents the people of Milwaukee at the time paid $7\frac{1}{4}$ c for a loaf as it is today but did not know it. The 5c loaf was a fallacy—if not a fraud.

The Consumer's Goal

Bread of good wholesome quality, economically priced at rock bottom figures, must be the goal we seek to reach and the ideal we strive to attain.

Mere "cheap bread" is not desirable.

It means that the farmer is to get little for his grain, that the miller is less careful in milling and cleaning his wheat. In the bakery it means inferior materials are used. It means that bakery workers are poorly paid and must lower their standards of living. It means a neglect of

sanitary conditions in bakeshops. It means a class of people with lower standards of living will find their way into the production of the staff of life and a return of many of the abominations we strove to abolish.

I speak this advisedly, I have worked in bakeshops for \$1 a week, something to eat and a place to sleep, in this city. I have been in the game about 40 years. I have worked for others and have operated my own shop. As inspector of bakeries for the state, I have visited practically all bakeries in the state and have closely studied conditions so I know what I am talking about.

Coal Tar Color

THE public press and publications like your BAKING TECHNOLOGY have done more to protect the people of the country than the laws. The use of coal tar color in place of eggs in pastry is an iniquitous practice and we propose to break it up in Pennsylvania.

JAMES FOUST,

Director Bureau of Foods, Pennsylvania
Department of Agriculture.

Better and Better Bread

OLAF PETERSEN was a student at our School of Baking. He was sent to the school by the Petersen & Pegau Baking Co., of Omaha, Nebraska. As soon as he graduated he went back to the bench from which he came. He had been a baker for many years and knew the business as well as any man could ever learn it in a shop at steady production. He wrote in this opinion of his school course after a few months back in the Petersen-Pegau plant:

"I want to tell everybody I meet about the Institute and the School but I am no good at putting my meaning into words.

My course has helped me considerable in my work, for now I know for the first time the action of the different materials, and what is taking place in the dough while it ferments.

"My people here are hard to please when it comes to making bread but I know now that I can do it. My advice to bakers is to go to the American Institute School of Baking and take a four months' course and they will never regret it.

"It has been a wonderful experience to me—one I will never forget. The Institute staff I found always willing to help a fellow if there was something a little hard to get. They always made me feel at home.

"I haven't had any trouble since I came home. I am going to rig up a small laboratory to continue the habit of making tests I learned at the Institute. I am getting a better system than I had before and am remodeling my formulas to get a better and better loaf of bread. Please remember to send me my Baking Technology and by the way don't forget my Diploma which is due."

Getting Rid of Waste

THE Chamber of Commerce of the United States keeps a watchful eye on those industries which try to eliminate waste in manufacture. Just now the Chamber experts have been watching the processes of cutting out waste by cutting down varieties of manufactured articles. They have found the baking industry among the foremost in the country of the leaders working towards standardization of output.

"Any man selling to others is in a position of trust," says a great leader of the Chamber of Commerce. "And waste and extravagance are a breach of trust. Varieties are pyramiding to such an ex-

tent that the science of mass production for which America is known the world over is being lost. One of the most essential lessons taught by the war is being forgotten. There has been much catering to the whims and fancies of the purchaser and an insatiable desire to satisfy the demand for something different.

"In production small variety and large volume is the ideal. Each line must pay its way to justify its continuation."

Of those industries working in the right direction the baking industry is rated very high. It is shown to have reduced varieties from 15 to 6 and to have accomplished 60 per cent reduction in waste due to too many varieties.

Water bottles, which have been reduced from 20 varieties to 5, wheelbarrows, reduced from 42 varieties to 16, and stove parts, reduced from 2982 varieties to 364 varieties are among the other great savers.

When some Sourface at a meeting claims that "frivol and fun are robbing the time for convention business," don't you believe him. The so-called frivol and fun are the heart of the whole thing. They get one baker accustomed to the way of the other. They develop the power to "talk a common language." And we can never march to a common purpose until we can talk common words of mutual understandings. President Korn has learned his Rotary lesson and it means he is pulling hard, with all the strength of his Administration, in the one direction that will end the strifes now racking and wrecking our world of Bakerydom.

I want again to thank you for the trip through the American Institute of Baking yesterday. As I get out among the bakers I will, of course, tell them about your splendid Institute as anything that will benefit your Association and the Baking Industry in general, will benefit us.

—L. W. Parks, G. B. Lewis Co., Mnfrs. of the
Lewis Box, Watertown, Wis.

Books for the Baking Laboratory

VITAL FACTORS OF FOOD. VITAMINS AND NUTRITION. By Carleton Ellis, S. B.; F. C. S. Consulting Chemist, and Annie Louise Macleod, Ph. D. Associate Professor of Chemistry, Vassar College, D. Van Nostrand Co., New York, 1922. xiii—391 pp. 22 figs.

The aim of the authors of this book is to give the reader not only the essential facts on vitamins but a comprehensive reference work on some of the special but highly important phases of the nutrition problem. Appearing at a time when his attention has been called to various products intended to increase the nutritional value of bread, the information to be found here has considerable significant interest for the baker.

Following an introduction which presents the elementary principles of nutrition in a few pages, the reader will pass on to chapters on what the vitamins are and what they do, the experimental methods used in determining them, their distribution, stability as to heat, chemical structure and properties, concentrated preparations, number of vitamins and their role in nutrition. Other chapters treat of the so-called deficiency disease, rickets, beriberi scurvy, xerophthalmia and pellagra.

Milk, vitamins for the baby, old food through new eyes, what to eat from the vitamin standpoint, use of vitamins in clinical medicine, and the relation of vitamins to the lower organisms are the final divisions of the work. A useful table of thirty-three pages on the distribution of vitamins concludes the text.

The authors of the "Vital Factors of Foods" have waded through an amazing and confusing mass of vitamin literature with some success. The generally available data has been abstracted from the special journals and assembled in an interesting and readable manner, though the impression is left on the reader that but slight attempt has been made to balance and critically summarize the literature on the basis of relative authority and importance.

The chapter on "Old Foods Through New Eyes," "What to Eat From the Vitamin Standpoint" will interest the baker. The authors state that "It is unfortunate that flour, which makes up so large a proportion of the daily ration, should have been robbed of its vitamin content in the milling process, but the refined product of the modern mills is useless as a source of vitamins. Whole wheat bread furnishes both A and B, and the

combination of whole wheat bread and butter, milk, and fruit is an admirable one as regards vitamins."

The book is above the average in freedom from typographical errors and will undoubtedly be of considerable usefulness to the general reader on nutrition investigations. While evidently written before the formal monograph of Sherman and Smith was published, it will still have some interest to the special student. The "Vital Factors of Foods" possesses the inherent quality of popularity in the style and general arrangement, whether or not one likes the term "vital factors" for the title of a book avowedly scientific.

C. B. MORISON.

For A Baker's Library

The following list of books on baking and relating subjects has been prepared in response to many requests from our readers.

WHEAT AND MILLING.

1. **The Story of a Grain of Wheat.** Edgar. An interesting popular account of wheat and its journey from the farm, through the mill to the baker by the editor of the Northwestern Miller.

2. **The Process of Flour Manufacture.** Amos. London 1915. An English text book for use in schools of baking and milling. Written from the English viewpoint in milling, it is, however, of considerable value to the American student.

3. **Flour Milling.** Kozmin. N. Y. 1917. An English translation of a Russian authority. Like the book by Prof. Amos it is written from the European standpoint. Since there is no similar work by an American as comprehensive as Kozmin's it may be recommended as a useful text.

BAKING TECHNOLOGY.

1. **The Technology of Breadmaking.** Jago. London 1911. This is the pioneer book on baking in English. Published first in 1886, second and third editions appeared in 1895 and 1911. The Bakers' Helper Co. of Chicago have recently issued an American edition. This important book is badly in need of revision for the purpose of including recent scientific research and eliminating certain parts of the text

which have but slight value except for historical reference. It stands alone, however, as the most comprehensive work that we have in English on breadmaking.

2. **The Chemistry of Bread-making.** Grant. London 1920. This is a small book designed for the use of students in schools of baking and milling in Great Britain. As a beginner's text book it presents fundamental points of importance but is not considered an accurate text particularly by teachers of chemistry.

3. If the student is familiar with German, the text book of Prof. M. P. Neumann, "**Brotgetreide und Brot**" is valuable. The recent work of Dr. Fornet, "Die Theorie der Praktischen Broterzeugung" is perhaps the most up-to-date text book on baking. The older work of Maurizio, "Die Nahrungsmittel aus Getreide" is also highly important as a work of reference.

4. **Bread Facts**, published by the Ward Baking Co., has now reached its fourth edition and contains many useful facts presented in plain language.

5. **The Story of a Loaf of Bread.** Wood. Cambridge 1913. A popular account of bread from the growing of wheat to the nutrition of man. Essential points presented in an interesting way.

6. Other helpful books for the practical baker are:

"**Baker's Bread.**" Richards.

"**Treatise on Baking.**" Wihlfart.

"**20th Century Book for the Progressive Baker.**" Gienandt.

"**Secrets of Breadmaking.**" Braun.

"**Modern Baker, Confectioner and Caterer.**" Kirkland.

"**The Book of Bread.**" Simmons. An interesting English work.

Baker's Weekly Recipes. A Handy Guide for the Busy Baker. This is a selection of Recipes for Quality Goods of the "trade getting" variety. Compiled by the Technical Department of Baker's Weekly.

The above short list of titles has been mainly confined to the technology of bread-making and milling. The special literature of the fundamental sciences on which baking is based have not been mentioned. The list is intended as a guide to a little library of useful books for the practical baker.—C. B. Morison.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

The Molds of Bread. W. Herter and A. Fornet. Centr. Bakt. Parasitenk., Abt. II, 49, 148-75 (1919).—Eleven different species of molds were isolated from bread. These molds are harmless for man and animals, but are to be avoided because of the loss of nutritive substances in the bread. Salicylic acid has little or no influence on the growth of mold in bread.

JULIAN H. LEWIS.

Moisture Determination. M. E. Schulz. J. Am. Assoc. Cereal Chem. 7, 73-4 (1922).—Samples of flour placed in sealed metal containers were sent to 12 different laboratories for the determination of moisture. The results vary from 12.79 to 13.90. The three laboratories which used a vacuum oven obtained 13.90. It is almost imperative that the cereal laboratories be equipped with a vacuum oven to insure more accurate results. R. B.

Determination of "strength" or neutralizing power of acid calcium phosphates. W. E. Wadman. J. Int. Eng. Chem. 13, 1146-8 (1921).—Since the real purpose of such a test is to determine how much NaHCO_3 can be neutralized, and its CO_2 liberated, by a given amount of $\text{Ca}(\text{H}_2\text{PO}_4)_2$ when used in leavening breadstuffs, the test should be conducted under conditions as nearly as possible like those which prevail in actual baking practice. These conditions are more nearly met by direct titration with standard alkali of about 0.5 N strength with about 30 cc. of H_2O per gram of phosphate and a liberal amount of phenolphthalein. G. W. Stratton.

Milling quality of Saskatchewan wheat. Manley Champlin and Cyril H. Goulson. Sci. Agr. 2, 283-92 (1922).—Tables show the results from 1913-20 of milling and baking tests on the same varieties of wheat, the influence of the time of cutting and of seeding, the difference in the strains of one variety, and the variations in the milling and baking tests of the same wheat from different points in the province. Dorothy B. Scott.

Food Flavors: their source, composition and adulteration. J. W. Sale and W. W. Skinner. Am. Food J. 17, No. 5, 13-15, No. 6, 31-2, No. 7, 27-9, No. 8, 27-8, No. 9, 29-30, No. 12, 29-31 (1922). A discussion of 89 various products used as food flavors, with a bibliography of 78 references.—H. A. Lepper.

Sand and Talc in Yeast Food

Analysis of Product Offered to Bakers Reveals Harmful Ingredients in Its Makeup

THE faker still lives and thrives after a fashion—and to the baker he sometimes brings his wares. Recently one of our members sent us two samples of yeast food for an analysis and our opinion. When the analysis was completed it was brought to A. W. Landstrom, Chief of our Analytical Laboratories. "Something is wrong," said he, "why this report shows that about 17 per cent of this sample is silicon dioxide (sand), repeat the analysis!" Back it went to the laboratory—and again this result was obtained. Something was wrong with that sample—decidedly so! Further investigation developed the surprising fact that over 25 per cent of this yeast food could not be dissolved—even by boiling solutions of acids! Fine stuff to put into any food, and especially "Bread, your best food."

After considerable testing this mysterious non-soluble ingredient was found to be talc—the same as talcum powder, and chemically the same substance, as your soap-stone hearth!

Have any more of our members been unwittingly putting talcum powder into their doughs at a fancy price? It was precisely because of the need to catch fraudulent material of this kind, backed by super-salesmanship, that the American Institute was founded by the far-seeing pioneers of the Baking Industry who were willing to back their vision with real effort.

Each new member of the Association means a wider distribution of the privilege of supporting this Outpost on the Highway to the Universal Quality Loaf. The

baker who sent in this fraudulent yeast food inclosed it in an ordinary fruit jar, but furnished us the name of the maker after we had asked for it, on submitting our report. We have obtained other samples in original containers and are repeating our tests on them.

Laboratory Service

It was precisely because every leading American baker realizes that laboratory service is a thing bakers must build up in common, for the use of all, that some hundreds of American bakers who also believed in supporting the American Bakers Association, set up the laboratories of the American Institute.

The pioneers are being supported now by hundreds more who believe in cooperation and organization and follow faith with works. We are very proud when retailers bring us their problems, for no poisonous propaganda is so harmful as that which pictures our industry as one whose leaders believe in big bakeries alone. And so would throttle and destroy little bakers. From Ohio five small plants have just sent us samples of flour asking for a cure for holes in their loaves or for streaky loaves. In every case laboratory tests found the trouble and sent on a report that was followed by a cure. Membership fees covered most of our cost, for we are here to serve each baker in his hour of need. In turn the baker who had trouble serves his whole industry by putting out a better loaf and making a better name for "baker's bread." That is where we all profit by such service.

BAKING TECHNOLOGY

*A Journal of
Applied Science
in Baking*



*Published by
The American Bakers
Association*

VOL. II

CHICAGO, ILLINOIS, APRIL 15th, 1923

No. 4

Wheat and Prosperity

IF you never before read an article in this magazine this is one you simply have got to read. It doesn't matter if you are a small baker and fear that the National Association is composed of big bakers who will overshadow you — it concerns your pocket-book and your welfare just the same.

It doesn't matter whether you are a flour man, a raisin man, a cotton man, a machinery man, an allied tradesman, a pie baker, a cake baker, a bread baker, a macaroni baker, or a cracker or other baker. This story concerns all of you equally.

It is a story of the uniting of many people to reverse the gears on one of the major war

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policies. This policy was to win the war by SAVING WHEAT.

In its initial course the policy was laid down to "take the eat out of wheat."

Men who acutely understood the needs of the Nation set up that policy in an hour of National stress. Now men of the same acute insight see another National emergency. They want to solve it by the sanest and shortest method.

This method, as it happens, is to "put the eat back into wheat."

They want to put the vogue of bread and bakedstuffs eating back to the status it occupied before the war trained folks to other habits. These men include the same force-

ful leaders who coaxed the people away from wheat foods.

In the task ahead there is work for you to do, whoever you are. It isn't any one man's task. It isn't any one group's task. It is a bakers' task or a millers' task. It isn't the task of advertisers alone.

It is the farmers' task, the grocers' task, the bakers' task, the politicians' task, the President's task, the Governors' task, the teachers' task, the industrial leaders' task in every line.

All are coming together in the largest co-operative group ever formed around the wheat growing and the breadstuffs industry since the co-operative work of the war was over.

There is one thing keenly to regret as this hour for co-operative action on a large scale comes to the baking industry. It is that there are not 10,000 bakers taking step and working through one National headquarters—all equipped with listening devices for the message that now must be broadcasted—instead of the skeleton organization of pioneer leaders who will really carry the burden of this co-operative service.

For the first time since the American Institute of Baking sent its lightning rod up into the air to attract current for the baking world, the millers have struck home to us hard, retail bakers, who were formerly filled with suspicion, have come into session with us, flour men who always advertised against each other have sat down together as friends to talk of ways to pull together and "glorify the product—not the brand."

The news of the situation in brief is simply this: The greatest advertising campaign ever thought of for the industries centering around wheat is now being launched. It is being launched with pooled efforts, which are merged around a common purpose, directed at a common objective, eat more wheat.

Bakers—as great as the baking industry

is—are only one spoke in the wheel of co-operation. There are wheat hauling railroads in it, there are cotton manufacturers' organizations, there are dairy organizations, statesmen, congressmen, governors of states, teachers of universities and grade schools, commercial clubs, farmers' organizations, millers' organizations.

And nobody is going to get any special glory for it or any special credit.

It was one of the beautiful things of modern America to see this mammoth new campaign mould itself into shape.

The forces involved have formed a central clearing house. It will work closely with the American Institute of Baking and will distribute to all bakers knowledge of just what is coming along, in the three or four months ahead, in the way of national messages about wheat, flour, and bread and their relationship to the basic national prosperity without which there can be no sound prosperity of any kind.

The bakers will learn that in June, for instance, five national magazines will sound the slogan of "eat more wheat because the farmer needs to have his purchasing power restored."

The baker in Sacramento, or Atlanta, New York, or New Haven, can then advertise in local papers, creating the local psychology that it is time to "put the eat back into wheat by eating Jones' bread, or Smith's pies, or Braddock's cake. Even the macaroni, the pie, and the cracker bakers can all utilize the national messages to increase wheat consumption by trying their own particular wheat products.

Here, briefly, are some of the elements whose interests converged in a kind of temporary WHEAT INSTITUTE, which will clear the news of this campaign to all concerned.

Bakers were interested primarily in consolidating their war-time gains by buying more and more machinery with which to

turn out in modern sanitary shops the modern quality loaf. The American Bakers Association was out in the work of obtaining contacts. Its director, Dr. H. E. Barnard, was preaching for an end to self-centered advertising. Instead of meat advertising which dubbed "bread a most unwholesome cereal," Dr. Barnard wanted to see meat advertising which showed a slice of ham or tongue or beef between two slices of bread. He wanted to see the meat man tell his story in some such slogan as "it's fine in sandwiches." Similarly the word for co-operation was going to all the makers of products that can be used in bread.

The butter men responded splendidly. So did the dairy interests.

The Farmers' Interests

So did the makers of many other products naturally served with bread. While this campaign was being formed and launched, along came the farmers. They had a grievance. Sidney Anderson, chairman of the joint house and senate committee on farm credits, voiced it for them. It was that they had been forced back to pre-war prices for wheat and besides had a surplus of over 176,000,000 bushels of wheat on their hands that destroyed their buying power.

With the farmers' grievance came many others. The grain carrying railroads were in trouble because they could not carry to the seaboard the American wheat surplus. Usually it had gone to Europe as an export commodity.

It was found that the European market had collapsed. It could not absorb the American wheat surplus.

Statesmen, cabinet officers, congressmen began to think. There was the old food administration group. Could any of them suggest a way to induce America to absorb the wheat surplus at home? In England they found a new slogan going around. It

was "Within the Empire" and its meaning was that home-grown products should be used as much as possible.

Into the situation at this stage came the baking group, the food control group, and other groups who had served under Hoover to help win the war.

Could they be mobilized again, in an economic crisis in America no less acute than war, to solve the problem now pressing upon the Nation?

To a meeting of this old-time group was outlined the need to bring buying power back to the farms. A man who had served in the U. S. Food Administration's milling division, did a little figuring. He divided the 176,000,000 bushels of surplus wheat into 35,000,000 barrels of flour. This in turn he converted into the form of 72,800,000,000 loaves of bread or its equivalent in pies, cakes, and sweet goods.

This again was divided into the terms of slices of bread per person in the United States. A rather startling result was obtained. It was that if one slice of bread per person per meal was added to the diet in America, the farmer could win his way back to prosperity and his deadening wheat surplus could become a life-giving surplus of farm-earned cash.

Groups Co-operating

Only men of vast national experience and a seasoned view-point on national affairs, could have grouped together the forces that now are joined to drive home the message, "put the 'eat' back in wheat."

Butter men were called in. They did some figuring and found that a slice of bread per meal more in America would mean an added consumption of a billion pounds of butter for the spread.

Milk dealers and dairymen were consulted. They added the thing up and found that 35,000,000 barrels of flour, added to those now baked per year, would call for

350,000,000 pounds of dry milk in addition to the volume now used.

The cotton manufacturers responded quickly. They found they had an acute interest for the failure to market the American wheat surplus meant their own failure to sell 40,000,000 yards of cotton cloth that would have gone into the business of sacking this flour.

Even the packing interests responded to the situation for they saw that victory in the new campaign would mean an added use of 140,000,000 pounds of shortening in America's bakeshops.

Sugar was no less slow than the others for there was spelled out to them an opportunity to put 140,000,000 pounds of sugar into the national diet.

Thus the groups assembled.

The first three governors of states approached responded with alacrity. They issued proclamations setting forth the national wisdom of eating more wheat for more basic prosperity. Twenty other governors of wheat growing states are studying the situation and proclamations from them may be expected through the spring.

Senator Copeland's View

One of the most interested advocates of the "eat more wheat" campaign is United States Senator Royal B. Copeland of New York. He saw at once that good policy required a larger share in the national prosperity by the farmers. He believed in the healthfulness of wheat foods in the diet. He threw behind the campaign the whole power of his publicity as author of a daily talk on health, published in scores of newspapers, that reach 10,000,000 people.

Washington May Act

In Washington congressmen took up the cause with alacrity. One promised to see that the President learned about it all, and that the cabinet should give over a session

to its discussion. These are the plans that are still maturing. If only the bakers of America were a solid unit so that they could all get the advance signals, and understand them from a careful study of this background story!

As a first brush, the American Institute sent out stories of the formative moves of this great plan to fifty farm papers and 150 daily papers. Almost by return mail came this letter from the National Grocers' Bulletin. This paper can do much to line up with the baker, the groups that sell his bread across the counter.

"In the April issue of our magazine," wrote H. C. Balsiger, its editor, "we are carrying a story on the 'eat more wheat campaign.' We shall do our part to get this big idea across to the man behind the counter."

"The Producer," organ of the wheat growers of the Pacific Northwest is no less enthusiastic in its indorsement.

Thus the story sails out into the winds of Circumstance and Events. Where will it end. Before it is done it may result in the formation of a permanent Wheat Institute with a milling division, a farm division, a bakers' division, a macaroni division, a cracker bakers' division, a machinery division, a supplies division, and a continuance of organized effort behind this most important of American foodstuffs.

From a Health Commissioner

I must say Baking Technology appeals to me as a worthy effort to improve the plane of baking. It certainly is worth all the support that the trade can give it and I heartily commend your constructive efforts.

J. H. SHRADER,

Director, Health Department, City of Baltimore, Md.

The New Graduates

The third class of diplomaed bakers go out this week from the American Institute of Baking to serve the Industry's members who sent them to our Baking School is swelled by these additions until the group now reaches all corners of the industry. Those now graduating include:

L. K. Abrams, C. E., The Livingston Baking Co., Chicago, Ill.

T. M. Carpenter, The M. Carpenter Baking Co., Milwaukee, Wis.

Ray L. Farlin, The White Front Bakery, Webster City, Iowa.

Cecil Garrison, The Hub City Baking Co., Oelwein, Iowa.

Jas. R. Harris, The Harris-Boyer Co., Johnstown, Pa.

Adolph C. Jacobs, A. & O. Jacobs, Creighton, Neb.

Frank J. Kessler, Oswald-Jaeger Baking Co., Milwaukee, Wis.

Frank McDonough, Cushman Sons', Inc., New York City, N. Y.

J. E. Pass, Chicago, Ill.

Rex Schmidt, Matthae Bread Co., Tacoma, Wash.

Otto Schmitt, Grant Baking Co., Chicago, Ill.

Henry C. Scott, Hazelton Baking Co., Hazelton, Pa.

Ralph Seeley, Seeley Bakery, Hicksville, Ohio.

Loraine Sultzman, Sultzman's Bakery, Hannibal, Mo.

Wm. Vogel, Taggart Baking Co., Indianapolis, Ind.

Ogden Geilfuss, Geilfuss' Bakery, Spartanburg, South Carolina.

Robt. P. Wirth, The Fleishman Co., Chicago, Ill.

Robt. M. Woods, The Ward Baking Co., New York City, N. Y. (Graduate Student.)

Wilbur E. Cushman, Cushman Sons', Inc. (Graduate Student), New York City, N. Y.

The Newer Vision

JOHN L. GROSS, editor of the Milling and Baking Trade Review, published at Philadelphia, "in the interest of better baking," is one of those who realize that better baking can come only through better scientific knowledge.

He knows, more certainly than thousands of bakers who should know it, how important the American Institute of Baking is to the baking industry. He sensed the newly-arising sentiment in favor of supporting it, and wrote to Raymond Stritzinger, member of the Board of Governors for Pennsylvania, about it. The answer was an illuminating statement of the significance of the American Institute in all future working out of bakers' problems.

It is pleasant to note this answer for Mr. Stritzinger came up through service to his own state organization.

"Bakers can only mean one thing," Mr. Stritzinger wrote, "for the dictionary says a baker is one who bakes. It does not differentiate between retail baker and wholesale baker.

"Neither does it indicate any difference between the manufacturers of bread, rolls, cakes, pies, pastry, biscuits, or crackers. Nor does the American Bakers' Association differentiate between types of bakers. Its constitution specifically provides for the membership of any manufacturer of baked products and is entitled to the support of those eligible for membership, as well as of members of allied industries.

"You can insure the future of your industry, increase its profits and service to mankind and help to raise the standard of the entire industry in the eyes of the public as well as in actuality for an expenditure of 7 cents per day per oven. Come to the convention at Bedford Springs, June 18-20, and learn the work that is going forward."

More Wheat—Eaten as Toast

American Institute's Campaign to Put an Electric Toaster on Every American Breakfast Table Brings Results

DO ALL the faint-hearted bakers in America, who have buoyantly asked what they have lost by refusing membership in their own national association, know that the weakest spot in the American menu, from the point of attacking it with a campaign to bring a larger volume of bread into use, is the American breakfast?

Do these same bakers realize that people, in their search for specially prepared, quickly-served breakfasts, buy so-called prepared foods at 50 per pound, when they could get better nutriment out of toast with coffee, butter, and preserves, at 10 cents per pound?

And do these recalcitrant bakers, who will not take step with their associates in a national way, know that electric toasters of the highest possible efficiency are now built in a manner to make toast for breakfast one of the easiest of all foods to prepare and serve? Do they realize that a "Toast for Breakfast" campaign is matured, and ready to launch behind the "Eat more Wheat" campaign which promises to add more bread slices to the total of American consumption than any other campaign now before the people?

The American Institute of Baking is able to announce that six months ago it found thirty different toasters on the market, all designed by electrical engineers who had never seen a slice of bread, apparently. That is they had solved the electric problems, but had never given a thought to the bakers' problems and the consumers' desires.

The American Institute of Baking is further able to announce that as a result of researches in its own laboratories, in

which baking knowledge was brought into close contact with electrical knowledge there are now seven types of toasters on the market that "deliver the goods" as compared with only three before this special research was undertaken.

The engineers in charge of the design of these seventeen toasters met the engineers in charge of our researches. After the meeting the toasters were redesigned to conform to the needs of the baking industry and the expectation of the purchaser that she will get real toast on her breakfast table, toasted at real speed, while breakfast is still being served, and not after it is all over.

In a new spirit of co-operation an advertising campaign is being worked up in which manufacturers of electric current, of electric toasters, of butter which is never spread so thick, to such good advantage as upon toast, and of bread, will all combine to popularize toast for breakfast and to push the sale of splendidly designed low-cost toasters on which to make this toast in the most convenient way.

The merchandising problem of getting the toasters into the home is capable of indefinite expansion. No hard and fast selling system is yet agreed upon.

The Executive Committee of the American Bakers Association heard the details of the Toast for Breakfast Campaign, as it was submitted to them by Dr. H. E. Barnard, Director of the American Institute. They approved it unanimously. It is now out of the experimental and development stages and is ready to be pushed "full speed ahead."

Every baker who wants to keep up with

the development of this campaign and who wants to understand its background will be interested in reading the rest of this preliminary report upon the experimental work to develop a good toaster and find out the evils of the bad ones.

The Co-operators

Dr. L. A. Rumsey of the American Institute took up this research in our own laboratories. He made known his purpose to electric manufacturers and twelve manufacturers offered their co-operation. These companies included Waldvogel & Co., the Edison Electric Appliance Co., the American Electrical Heater Co., the Rutember Electric Co., the Westinghouse Electric and Manufacturing Co., the Fitzgerald Manufacturing Co., the National Products Co., Landers, Frary & Clark, Manning, Bowman & Co., the Russell Electric Co., the Best Stove and Stamping Co.

The very act of co-operation here undertaken was a new step in our industry for the Sunmaid Raisin Co., for instance, had to put its own research men on the problem of seeding raisins, without a bit of help from electric research laboratories. The Sunmaid experts had to develop and invent new electric devices by themselves until they had worked out twenty different electric machines to seed and pack raisins. They have been the salvation of the Sunmaid company, for work is done under one Fresno roof now that formerly took hundreds of laborers in scores of small plants.

Toaster Qualities

The first problem was to find out how good the toasters were. They bore such inviting names as the Hotpoint, the Rite-Heat, the Glowler Stove, the Flipflop, the Turnover, the Star, the Hot Plate. The experiments showed that while one toaster would produce a piece of toast in 3 minutes, another took 6.5 minutes. One even required 11 minutes.

Many Kinds of Toast

The quality of toast the different toasters turned out varied as much as the quality of bread one might buy in a large city. One supplied such intense heat that the bread burned before it toasted.

Another left a blank strip a fourth of an inch wide along the bottom of the slice of bread. Only a very few of the toasters would take the bakers' standard loaf of 24 ounce size. Some made good toast along the bottom but burned a strip along the top. One toasted the bread evenly, but did it so slowly that it dried out before it toasted.

And then there was the best one on the market. It toasted the bread evenly, brought it up with a fine color. It took the pound and a half loaf slices, and had a device for turning the toast that always worked well except for very thick slices. With these facts determined, it was ascertained just why each toaster fell away from the ideal. Suggestions were made to the manufacturers. Most were acted upon. It is much easier to get a good toaster today than ever before.

Prices Reduced

With the problem of the toaster itself out of the way the next thing taken up was the price. Manufacturers were convinced that toasters would remain in the Christmas present class so long as they were priced so high. It was found that they sold all the way from \$3 to \$12 retail. Price quotations in bulk were obtained for possible use should the baking industry itself decide to distribute toasters as a basis for selling more bread in modern cities.

Under the new price lists the cost per toaster was reduced to the lowest possible figure consistent with good quality and proper efficiency. Three styles were especially praised as conforming to American

Institute design and the Institute expectations as to reasonable price.

On Other Breads

The tests at first were on standard 24-ounce, round top white bread. Then they were switched to other types of bread. These included whole wheat, graham, milk, rye and raisin.

It was found that toasting rye and whole wheat breads so improved their flavor that they appealed to consumers who could not be interested in the untoasted forms of these breads.

Fixing a Standard

What is the perfect toast? Toast was found to differ, on close study, almost as much as bread of various types. It might be toasted just on the surface or it might, by a slower application of heat, be toasted clear on through as a kind of "rusk." Such toast would be a hard dry slice of bread, suitable for dipping into tea, coffee or milk.

As a standard towards which to work, a toast was selected somewhat as a compromise between these two extremes. This was an intermediate "crunchy" slice that appealed to by far the larger number of toast users.

It was found that in making this type of toast much of the bread slice's moisture was imprisoned within the surface walls of the toast.

Imprisoned also, and accentuated in appetite appeal, were the "wheaty" flavor and aroma. It was even found that bread which had been baked for several days, and had lost all appetite appeal, could be restored to tempting form by being converted into toast. This was especially true of whole wheat and rye breads. The "parching" of the bread's protein was found to be the same in flavor effect as the old fire-place parched Indian corn once served with apples on winter evenings

Toast Flavor

Good toast has a flavor of its own, different from that of the bread from which it is made. This flavor was found by experiment to depend on two factors; first the dextrinizing of some of the starch; then the caramelizing of the sugars and the "parching" of the proteins in the fresh crust. Finally it was found to depend also upon the "wheaty" flavor of the undried, springy crumb.

Dangers to Avoid

In making toast the worst foe of toast quality was found to be too hot a fire. It was found that 5 to 6 minutes were required to turn out the best toast. Toast made in 3 minutes before a very hot surface, suffered because the outer crumb was burned, giving a thin, tough crust with a soft, steamy interior crumb, with a taste suggestive of carbonization rather than "caramelization" of the sugars.

Too slow a heat, on the other hand, was found to be bad as it dried out the interior and drove out the flavor-retaining moisture.

The thickness and crispness of crust was found to depend upon the rate of heating.

In our experiments the dry toast preferred by some people was best obtained by making the slice thinner, rather than to depend upon longer and consequently slower toasting of a thick slice. The resulting flavor and taste of a thin, dry slice was found to be superior to a thick slowly toasted slice.

Bad Toast—Bad Bread

Some bread would not make good toast. In every instance this was found to be poor bread as bread. One could pick out the first class bakers' bread from the first class kind of toast it turned out. For that reason first class bakers should be those first to press a toast campaign upon their customers.

The freshness of the loaf was found to affect toast quality. Bread from 18 to 30 hours old made the best toast.

Toast's Nutritive Value

The cereal grains which are used as breakfast foods, such as rolled oats, cracked wheat, or farina, corn meal, etc., require long cooking to make them palatable and completely digestible.

Several investigators have found by laboratory and nutritional experiments that from 2 to 8 hours cooking, depending on the nature of the material, is required to properly prepare these foods for the table. On the other hand, the prepared, or so called pre-cooked breakfast foods have digestibility coefficients which are much lower than bread.

The food value of the prepared foods in calories per pound has not been increased, while the cost per pound has been raised many fold, varying from 6 to 76 cents per pound. It is the cream and sugar eaten with these prepared breakfast foods which gives them their chief claim to a place in the breakfast diet.

The natural nutritive value of bread is perhaps not much increased by toasting, but its palatability and digestibility are greatly increased. The eating of two or three slices of buttered toast, with a glass of milk or cup of cocoa and a dish of fruit will furnish a greater amount of energy and nutritive value, not omitting the vitamins, than a similar serving of cereals.

The convenience of preparation, on the breakfast table, is an item not to be overlooked. The physiological effect, the stimulated increased secretion of digestive juices brought about by the aroma and taste of good toast, is often of more importance to the individual than the increased nutritive value.

Thus the American Institute's toast campaign comes out of its laboratories to full maturity as a matter to launch before the

baking world and the consuming public. The problem of merchandising the toasters will be considered in a later article.

Many people need and would welcome whole wheat or graham bread once a week, or more frequently, even as a part of their diet, if they could enjoy its flavor. Teach them the delicious, rich, crispy taste and flavor of properly toasted graham or whole wheat slices, well buttered, at the breakfast table, and they will welcome its appearance. In fact such a breakfast food occasionally will take the place in the regulation diet of rolled oats or porridge, both in nutritive value, digestibility and in palatability.

The last quarter of a rye loaf which has lost its appeal to the taste and is several days old, will surprise one by its fresh rich flavor after toasting.

The digestibility of breads is known to be approximately 95 to 98 per cent, as compared to other foods. The nutritive values of breads in calories per pound are approximately the same as the other forms of cooked or prepared cereal foods.

Farmer and Baker

OUR Industry cannot be stabilized or successful unless the producer of wheat is successful and stabilized. The "Eat More Meat" campaign was proposed by the Department of Agriculture as a means to save the cattle raisers, about 75 per cent of whom were busted.

If we do anything along that line I think it should be clearly understood that the baker is merely one step in the path of wheat from the field to bread upon the table. Our interest is in the producer of wheat. We must learn to serve him and his needs instead of merely writing boosts for the baker.

In other words, we want to awaken the farmer to the way we regard him.

—From a letter of Henry Stude, Houston, Texas.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

Published by the
AMERICAN INSTITUTE OF BAKING
1135 Fullerton Ave., Chicago

Entered in the post-office at Chicago, Illinois, as second-class matter, under the act of August 24, 1912.

Price, Fifty Cents a Number; Five Dollars a Year.

APRIL 15, 1923

Halved—Will It Double?

Our National Convention halved the dues for 1923. Will halving the dues double the membership, and thus stimulate the spirit of share-and-share-alike in both burdens and benefits?

Spirit of Membership

A BAKER who resigned from the Association which joins his interests with all others seeking to glorify bread before the people who might use at least a fifth more of it, added up the amount of dues he had saved. "And now tell me," he said to a friend, "what I have lost?"

"You have lost step with your mates," the friend answered, "and have lost a sense of yourself as part of a great industry, performing an important service. You have centered your vision upon yourself as a craftsman, in a little shop, looking narrowly out from a little door."

And what really had he lost in your mind; Mr. Reader? P. F. Peterson, perhaps, has as good an answer as any baker. His Omaha plant is in the midst of a zone which was torn by bread wars and dissension last year. Many bakers took the way out of resigning when they could have served

themselves best by a closer organization work than ever. Mr. Petersen observed this matter for a year, and observed the American Institute during the year. Then he took his pen in hand and wrote:

"It is easy enough to destroy confidence between members and the Association, but it is not nearly so easy to build up confidence after it has once been destroyed. For the good of the industry and for the good of the individual members of the industry, those who have resigned will have to come back in.

"They will have to support the Association and its Institute in self-defense, because competition will be so keen that unless you can produce a product equal to or better than your competitor's, you will soon be slipping out of the industry.

"I am optimistic enough to predict that within a few years there will be many more members in the Association, and more students will be applying at the Institute's door than you could possibly accommodate. It will not be a matter of going out and asking members to come in; it will be a matter of 'How are you going to take care of them?'"

Masters at Work

IN THE BUSINESS of putting words together about baking, there have been editors and editors. Just now there is the Editor of the Northwestern Miller at work on the Fiftieth Anniversary number; in the years of this journal the whole modern world

has arisen, as well as the modern miller and the modern baker.

Craftsmen have fallen upon hard days in many lines, as these have become industrialized, but the craft spirit will never be so extinguished, we hope, as to exclude a thrill over the splendid job of editorial craftsmanship shown in the production of this remarkable magazine. We have, of course, so far, seen only the advance dummies, for it does not appear until next November. But these show that no magazine of any kind has ever exceeded this offering in the richness of its art work, the quality of the literature brought together, and the beauty of make-up and page design.

For some time William C. Edgar edited a magazine of special appeal to poets and literary people. He has demonstrated in this remarkable edition of the magazine he now edits that he can bring every phase of art and literature into the service of the great industry it is now his business to interpret. When you receive your anniversary number with its rich color plates and beautiful pages, there is another man to whom you perhaps will feel like giving a thought. He is Mr. Hahn, the silent worker in the press room, and "side-partner" of the Editor. Mr. Hahn has loved the work of handling the types and plates of the Northwestern Miller as much as Mr. Edgar has loved his task of providing the words and headlines. Together they have gotten out every special number ever published; they have worked together for the Miller for over forty years.

There has been co-operation here—a real joining of two men, each a skilled craftsman in his line, to produce a magnificent result. To one who focuses the work of the published page back into the shop that produced it, there is an element of sadness in this work now going forward. Hahn, mechanical superintendent, and Edgar, editor, are making this number a joint monument to their forty years of service, neither of them expecting ever again to work together on another special edition.

Members Well Served

A BAKER who had made indifferently good bread for years suddenly awakened to the fact that the American Institute had been created FOR HIM. He sent in his loaves to find what was good about them, and what was bad. They scored 81—a low score. Our Service Department began to make suggestions about oven heat, time of fermentation, formulas—and week by week more loaves came in. Presently came a loaf that scored 96½, the highest score ever given in the Institute. This baker is L. V. Orsinger, of La Salle, Indiana.

Other bakers in Mr. Orsinger's district are now building up their loaves by a similar method of seeking guidance, instruction, and the new light of the latest researches.

The American Bakers Association numbers five bakers for every one who is taking advantage of this Bread Scoring Service as a means of building a Quality Loaf.

Rotarian of Course

FOR THE BAKER who wishes to learn what is going on in his community there is no college course that will match a membership in Rotary, the Chamber of Commerce, Kiwanis, the Lions, Gyro, or some other club built on these excellent high-speed-mixer lines.

The writer of these lines has frequently noted in conventions, such as that of the Oregon and Washington bakers at Seattle, the Pennsylvania bakers at Bedford Springs, and the Southeastern association at Savannah last year, that the presiding officer carried things off with exceptional skill. In each case it was found that the chairman was a Rotarian or a Kiwanian.

The latest example of this kind of skill was shown by A. J. Cripe, at the Kansas-Oklahoma convention. Chairman Cripe brought together the largest group of bakers ever assembled in that region to talk over their common problems. He presided over a four-day convention and kept every minute of it full of life, fun and "go." He did not overlook the wives of bakers for he had a full evening of dancing for them, with a theater party thrown in. It was only to be expected, when an acquaintanceship ripened into confidences, that this excellent bakers' organizer should turn out to be a Rotarian. He knew his community, and through it all other communities fighting similar problems. And he knew how to mix in a crowd, as well as in his dough troughs. Through such material is the future to be built.

At French Lick

BECAUSE the bakers of America are learning to play together, as well as to work together, the news that the next National gathering of bakers is to be at French Lick, during the week of September 9, brings a reaction of almost unanimous satisfaction. This is to be a great meeting, brim full of fun, good will, and a good time. Morning sessions alone will sharpen the appetite for afternoon sports, and for both purposes it is known that French Lick is equipped as are few places in this broad land of ours.

Our Alumni

TELEGRAMS and letters from home, asking most members of our graduating class of baking students to hurry back to the shop, to take some responsible position, indicate the newer confidence in the school-trained baker. The American Institute's third class is now about to graduate. Its members, like those of previous classes, want to keep in touch with their "Alma Mater" whose degree of A.B. means "A Baker." As a means to this end an organization has been perfected in which every student, as he leaves the school, becomes an active member. The new association is styled The Alumni Association, American Institute School of Baking. Harry Vories is its president; Joseph S. Weil, vice-president; Armand Hecht, treasurer; Herman Albers, secretary and Harry Fulton and Robert W. Brooks, representatives on the Executive Board. Class yells, a school yell, and all the insignia of a regular college now mark our classes.

Scientists at Our Institute

*Two Hundred Members of Chicago Section, American Chemical Society,
Learn How Baking Has Improved*

BREAD baking—the oldest of the hand crafts and the newest of the sciences, appeared in a fresh Spring garb, giving new conceptions and new impressions to 200 members of the American Chemical Society, when these scientists visited the American Institute of Baking on the evening of March 30.

Our 200 visitors spent the whole evening at the Institute, holding a meeting of their own in the Institute's class rooms, enjoying a dinner in another class room, and finally strolling in groups of ten or more through every department of the Institute from the Nutritional Feeding Experiment rooms to the shop where hot bread and hot rolls were being turned out for their use.

Many of them came to the Industry's own home and National headquarters doubting seriously that baking was a really scientific industry, but all went away convinced that mother's bread could not possibly be a product comparable to the output of a modern scientifically operated bakery.

There was something in the welcoming of a representative group of scientists to the Baking Industry's own National home that was reminiscent of dreams of long ago, that certain bakers felt would one day be a reality.

As one baker bent over his dough troughs twenty years ago hand-mixing bread he looked ahead to the day of Scientific Control, when a high-speed mixer should give the dough exactly the right number of revolutions and then should stop of its own volition. He had worked for the teaching of baking in the universities, he had helped to establish the American Institute.

Now he had the privilege of standing in

the Institute's own rooms with the visiting scientists and watching them while they admired a mixing machine that stopped exactly when the last revolution of its steel arms essential to the proper mixing of dough had been performed.

This veteran baker also stood while they watched the process of a fermentation control in all stages of the dough between mixers and the ovens. He had the privilege of hearing their words of admiration and praise, as they saw how much the modern chemist had come into control of the modern bake shop and its methods. He went through the research laboratories with them and marveled as they did at the result coming forth.

The evening at the Institute started with a dinner, at which Carl Miner, head of the Miner Laboratories and president of the Chicago Section, American Chemical Society, presided. It was served in an Institute class room. During the dinner the chemists were informed, informally, about the growth of the American Institute.

The story started back in Paris, with Louis Pasteur, discoverer of the Nature of Yeast, as well as of the modern sciences of bacteriology and medical practice in cases of contagion. It was traced through the Carlsberg Laboratories, where Emil Christian Hansen had discovered an infinite variety of yeast flavors, each made by a special species, or strain, and had developed the science of "pure yeast cultures." The story then came down to the work of Max Henius, who studied the Pasteur lessons and their meaning to Fermentation as Hansen had developed them, and then brought the Hansen method of Pure Yeast Cultures to America.

The building of the Wahl-Henius Institute of Fermentology was outlined, through the point of its sale to the American Bakers Association and the putting of its resources to work for the Scientific development of the baking industry.

Two scientific papers, each concerned with the baking industry, were the concluding feature of the evening's program.

Weaver on Milling

The first paper was by H. E. Weaver, chief chemist of the Larrabee Flour Mills, of Kansas City. He told of the testing methods used in modern flour mills to determine the proteins, ash, moisture, and gluten content of flours, and of the blending methods used to obtain uniformity in product.

Allen on a New Bread

The new loaf of bread produced by the Ward Baking Co., after experiments in nutritional feeding at several universities, was described by Dr. R. M. Allen, head of the Research Products Department of the Ward company. Dr. Allen told the story of the new loaf against a sketched-in background of the millions of American children who are found to be defective at 15 years of age. He outlined the work of the Hoover relief commission, which intended to transfer its activities to America and specialize on mal-nutrition among American children.

"The index to our problem of mal-nutrition," he said, "lies in the 6,000,000 undernourished American school children reported upon by nutritional experts. McCullom's work on Vitamine A at Wisconsin University, was a pioneer effort to work out the nature of new food factors. Pasteur gave us the "open sesame" to food factors involved in the fermentation of bread. The brewer reorganized his industry based on Pasteur's discoveries, but it remained for the baker to realize that all the complexities of protein chemistry, yeast biology, chemistry of enzymes, and, in fact, all the factors

of food science are combined in the production of a better loaf of bread.

"One of the most extensive, expensive and conclusive researches in nutritional investigation is that of the Ward Baking Co. Three laboratories have independently checked and corroborated the results. A white loaf of bread carrying complete nutritional requirements and vitamins has been produced which gives complete growth curves for white mice and rats through the fourth, fifth and sixth generations, each generation becoming stronger on bread and water alone. The nutritional characteristics of this new bread are now being studied on undernourished children through Child Welfare organizations."

Dr. Allen, speaking as a chemist, urged the chemists of the country to get squarely behind Dr. Barnard and the American Institute because the success of such a research, service, and educational institute would help every other industry whether meat, dairy, canning, or any branch of the food industry dealing with the nutritional problem of public food consumption.

The evening with the chemists was only an initial point of contact. What followed was much more interesting, if possible. One writer for a chemists' journal wished a full story of the School of Baking and came back to obtain it. Another wanted all the Institute's graphs for publication with a story already written on the "Role of Yeast in Bread." Another, connected with a large institution serving a noon-day luncheon, sent the bread purchased for the luncheon to the Institute, to have it scored for Quality. The chief chemist of a large packing firm came back later with a group of his associates to show them what a neighbor industry had accomplished.

Altogether the evening was one of the "red letter dates" in the very brief history of our Institute. How many bakers want to see such contacts made and built up—

and want to make the business of building them up a matter in which "they share and share alike" by joining the American Bakers' Association? The load cannot remain always on the few for the benefit of the slower-seeing many.

Our Sandy Yeast Food

SINCE we published last month the analysis of a sample of a newly marketed yeast food, which contained both talcum powder and sand many letters have been received, asking if this yeast food was some certain one among those well known to the trade.

For the benefit of many inquirers we will advise that this yeast food was not any advertised brand nor any well known brand. The acid insoluble part was found to be rather large. The acid insoluble part of the best known yeast foods is found by the same test which turned up our collection of sand and talcum in the offending sample, to be practically zero. We understand the makers of the sand-and-talc product have withdrawn it from the market. The name will be published provided authentic samples of it are found on the market that still offend as to the quality of ingredients.

From a New Yorker

BAKING Technology is of great value to the baking industry. The ideas and suggestions it contains will be sure to raise the business to a higher level. We look for its arrival and every article is read with interest by all of us. Every man interested in the baking industry should keep abreast of the new information it constantly presents.

L. A. WARE,

The Hill-Ware Co., Bakery and Restaurant, New York.

A Pledge of Help

AS AN initial effort to put flour and bread squarely in line as steps in production on the way from farmer to consumer the National Millers' Federation has adopted the following resolution:

WHEREAS, The deplorable condition of agriculture today is very largely due to the price of wheat, which, measured by the cost of production or by the purchasing value of the farmer's dollar, is lower today than it has been in a half century; and,

WHEREAS, This is due to an average production of 170,000,000 bushels over the demands of our present market, and failure to bring relief to the farmer from his present situation will have a serious effect upon every other industry and upon the consuming public; be it

Resolved, That Millers' National Federation pledges its support to an effort to consume the surplus of wheat grown in this country and now shipped abroad, which accomplishment means added health and saving to the consumer, and the measure of national prosperity that will come through the betterment not only of the 2,000,000 farmers who grow wheat, but of all producers of primary farm products which enter into the manufacture of wheat products, and which are companion foods in consumption; be it further

Resolved, That Millers' National Federation adopt and approve the national slogan of "EAT MORE WHEAT" and it urges upon its members, the milling industry and all associated industries interested in the growth and distribution of wheat and its products, the use of publicity to further the movement in every possible way, and to glorify the commodity. In order that every element from farmer to consumer may work to the common end with the fullest co-operation from all, it is essential that no one direct to his particular commodity expressions of exclusive value and virtue.

As Referee

ONCE the relations between millers and farmers were very bad and many disputes arose between the two industries. Then the farmers and millers set up tribunals for settling disputes and things got on a great deal better.

Within the baking industry the problem and the solution are similarly involved in recent events. Dr. H. E. Barnard, director of the American Institute of Baking, recently met with flour millers in Kansas City. They wanted to select some umpire to whom questions between millers of their group and bakers, could be submitted. This umpire would be empowered to determine the facts in case of any disputes over moisture in flour, quality of flour, and condition of flour at time of delivery.

The millers have suggested that the American Institute of Baking appealed to them as a scientific institute of unimpeachable character. They propose to accept its findings and act on them in case of any dispute in which they might become involved.

Similarly, in another case the Institute laboratories have just performed a peace-making task as a referee. It involved the amount of butter fat in a shipment of condensed milk. The buyer felt he was not getting the amount represented by the company. He hired a chemist. The selling company hired a chemist. The two chemists made reports that were widely apart. Each found for his client.

The next move was to refer the case to the American Institute. Here in a painstaking way our chemists determined the butter fat and reported the exact amount found. They were ignorant of the claims of all parties to the dispute and are not yet informed what kind of a settlement was made. But both sides are happy and

have their dispute well and amicably behind them.

New Laboratories

BEFORE the world fully wakes up to what Louis Pasteur really did when he discovered the nature of yeast and gave us an "Open Sesame" to the world of Microscopia, there will be a much greater building of research institutes, such as the Lister Institute, the Rockefeller Institute, the Sorenson Laboratories, the American Institute of Baking, the Fleischmann Laboratories, Johns Hopkins University and the Lane Medical College which seeks to interpret Pasteur's work by still further applying his principles directly to Medical Science.

Now comes again into the field Cornell University, perhaps the first university in America to respond to the discoveries of Darwin, Huxley, Tyndall, Pasteur, Koch, and their colleagues, by basing a university curriculum directly on science. Cornell developed many fields of science, and did much in the world of bacteriology. Now it finds this field so important that it is spending \$1,500,000 in building new laboratories.

These are to be open to students at the beginning of the academic year next September.

"It is my hope," writes George W. Cavanaugh, professor in the Department of Chemistry, "that we may interest some of our young students in the important field of the application of chemistry to food production. Our attention has been called recently to the use of ordinary salt in bread making and I have been asked whether the slight traces of impurities, such as calcium chloride and calcium sulphate, have any effect detrimental or otherwise. Perhaps the American Institute can send me some data, if you have worked this problem out."

As to White Bread

THE U. S. Department of Agriculture, through Dr. C. F. Langworthy, chief of the Home Economics Division, has put out a statement every baker should read and pass along to inquiring customers.

It is about bread made from white flour. So much layman's nonsense is being written about white flour bread that this statement by a responsible scientist should contribute much to a sane understanding of the situation. The official appraisal of the value of various types of bread follows:

The nutritive value of flour and bread of different sorts has been studied in connection with the food and diet work of this office. In general, the investigations showed that, considering both composition and digestibility, the fine white flour supplied the body with more protein and energy than the coarser flours did, since they were somewhat more thoroughly assimilated.

In considering such questions, one must also take into account mineral matters and the recently discovered substances, such as "vitamins," which are present in minute amounts in a great variety of foods, including the outer portions of the cereal grains.

If fruits, vegetables, milk and eggs are present in abundance in the diet, there is no reason to suppose that it will lack either vitamins or ash constituents. If, for any reason, the diet is very limited in the kind and quantity of foodstuffs available, it would be wise to choose the coarser grain products, which contain the whole grain or the bulk of it, rather than the finely milled products. It was such reasoning as this which led to the substitution of whole rice for polished rice in the Philippines, where the diet is very limited and the rice makes up the greater part of it.

Many of the popular statements regard-

ing grain products of different sorts are apparently based on belief and opinion rather than on experimental evidence. The consensus of opinion of well-informed physiologists seems to be that where flour is used as a part of a generous, mixed diet, such as is customary in the United States, the kind selected is very largely a matter of preference. It is also worth remembering that the use of different types of flour is one of the easy ways of securing variety in the diet, and variety is certainly very desirable.

C. F. LANGWORTHY,

Chief, Office of Home Economics, U. S. Dept. of Agriculture.

A Suggestion

A THOUGHT came to me today at the Rotary luncheon. Wouldn't it be possible for the Rotary Bakers of the United States to set one day aside in the near future for a bakers' day at the Rotary Clubs? A strictly bread luncheon should be served and the Rotarian member should give a short talk on the subject, "Bread Is Your Best and Cheapest Food." At the same time the Rotarian member might invite all the other bakers in the city to attend the meeting as his guests. This same day and same style of meeting might apply to the Kiwanis, Exchange, Lion, and Giro clubs. There are many ways of spreading the gospel that the Rotarian spirit is the bakers' spirit, and that "he profits most who serves best" is the motto of our industry, as well as of Rotary.

I hope every Rotarian or other club member will improve every opportunity to speak about the industry of which he is a part. In this way alone our message can be made to carry far.

—From a letter of William H. Korn, President American Bakers Association.

The Baker and the Underfed

*What Secretary Hoover and Child-Health Experts Are Looking For
As Cure for Widespread Undernourishment*

HAS the baking industry anything to say to the millions of children who are born perfect in America and yet become victims of mal-nutrition before they are 15 years of age?

Secretary of Commerce Herbert Hoover has tackled the problem of these millions of undernourished children in the same spirit in which he tackles all great problems. This is to "engineer" his way into a position to master them. He seeks first of all co-operation. And so he has called together all child welfare organizations. He has amalgamated the interests of the worthy leaders of this movement into the American Child Health Association.

This association proposes to bring growth to children where growth has been lacking before. It proposes to find the way to grow sound teeth where teeth have been lacking or have only partly grown in the natural teething period. It proposed a full chested race of American youngsters instead of a flat chested race.

What can the baking industry do to remedy existing conditions? Mr. Secretary Hoover has asked this industry this question. Many individuals in the industry are pressing forward with something as near as they can get to the answer.

It is in this field that the new nutritional loaf composed of whole milk instead of water-and-flour, comes forward demanding a hearing. Feeding experiments, fortunately, can now be worked out on test animals with a certainty that conditions will reproduce themselves in the human body, if they are produced in the bodies of rabbits, or rats, or mice.

The feeding tests now going forward at the American Institute of Baking will

shortly be published in detail for each added to a yeast-flour-and-water loaf to ingredient that may advantageously be improve its nutritional value.

Besides the whole-milk loaf, there is coming into favor in many parts of the country the milk-and-honey loaf. This is especially so in sections where a surplus of honey makes this commodity low in cost.

New Loaf Experiments

It is in the field of undernourished childhood that the new Ward loaf will make its greatest immediate bid for popular favor. Into this loaf has been poured a mixture of extracts said to be rich in the essential vitamins. In several orphan asylums and schools where children congregate human feeding experiments are going forward with this loaf. The results are still to be published. If there shall be found to be here a loaf that brings a child along with a full set of sound teeth, a full body development, and a more healthful spirit than the foods now commonly available in the home, its place as a contribution to nutritional advance will be firmly fixed.

There are many other loaves now coming upon the market. One adds a strong mixture of bran extract to the white loaf; another loads the loaf heavily with an autolized yeast extract. Feeding experiments alone will determine what added nutritional qualities these additions to the normal loaf make.

It is already reported that test animals fed on the Ward loaf and on no other food, except water, have grown to maturity, reproduced, and have reared young, to the sixth generation without the slight-

est falling off in vitality, and with an increased vitality, in fact, in the youngest generation.

Use More Milk

The American Institute experiments have already progressed to a point where Dr. H. E. Barnard, the Director, puts himself squarely behind the slogan, "Use More Milk in Your Bread for Quality."

Dr. Barnard insists that too much milk cannot possibly go into the modern quality loaf.

Here from the farms comes a cry, raised on behalf of farm children by Miss Jessie Hoover, milk utilization specialist of the Dairy Division, U. S. Department of Agriculture. She is interested in milk, to be sure, but if the bakers provided a bread that did away with the mal-nutrition of which she complains, what then?

"We find," she reports to her department chief, "that where milk consumption is lowest undernourishment is usually highest. Country children are undernourished in even a greater degree than city children. This is due to the fact that farmers sell their milk instead of using it at home."

Since more than 32 million people—practically a third of the continental population—live on farms, the vast importance of properly feeding the children in rural sections is evident.

A Coming Dairy Congress

Dairy Congress officials, among them H. E. Van Norman, have taken up this business of the undernourished farm child. He blames the condition on the dairy industry, in part, since it has taken away the farm churn and the farm supply of surplus milk. He suggests in these terms the need for a balanced ration on the farm table—this means, of course, a ration furnished in the nutritional advantages that may be packed into a modern quality loaf:

"For twenty years the farmers have been talking balanced rations for their hogs and cows. It is only now that we are beginning to apply the principle of the balanced ration to human beings; the farmers are just as slow to make the application as are the city people."

Next October a World's Dairy Congress will open in Washington, D. C. It will discuss "milk drinking in the home" as a special program feature. Cannot the baking industry so advance in the intervening months, in the use of milk in bread that we can induce them to talk of eating milk as well? In no other form can the child be so well assured of both his bread and milk ration as in a quality loaf of bread.

He Sets a Fashion

WHEN it comes to setting the fashion, perhaps the best qualified man in America is the President of the United States. One of them, President Jefferson, is said to have set the fashion for long pants and to have accomplished the downfall of formal court costumes.

Another made all outdoors very popular. President Harding is now in the White House and it is just possible he may lend emphasis to Grandma's favorite bowl of bread and milk.

Recently a waitress who served the President for some weeks granted newspaper men an interview on his eating habits.

"The President doesn't really eat," she said, "he is always in a hurry to get away for golf. Every noon he has a bowl of bread and milk,—half and half—and nothing else. At night he eats a little turkey, some sweet potatoes,—always a very light meal—and has no dessert. That made it a lot easier for me to wait on him."

Sand in Bread for Bravery

How Odd Baking Customs Affect the Health of Odd Nationalities

By DAVID STARR JORDAN

President-Emeritus of Leland Stanford Jr. University

HAVE you ever noticed that civilization in lands is directly proportional to the baking of bread? In the Torrid Zone where bread fruit grows on the trees, requiring no baking, and where slices of toast can be dried in the sun, there is no civilization to become effete and no one feels called to write on the Philosophy of Clothes. Sartor Resartus could never be written in a land of unleavened bread.

And have you noticed that the baking of bread is related to the growth of trees? Wherever Turks or Chinese have lived, the trees have been swept away and for lack of fuel the oven has been reduced to small-sized dimensions. This I have observed in Korea, Macedonia and Anatolia. And so the people discard grain and eat quantities of boiled rice, suffering meanwhile from starch-starvation, ignorance and beri-beri. Lack of fuel leads men to eat their corn-pone or polenta half-cooked, and this brings on discomfort, ending, some say, in pellagra. I noted, too, that in Macedonia bread was strengthened by the free use of sand in the flour. In the Greek camp Christos Aneste Hellas it was explained to me that the soldiers need sand in their business as hens need sand in their craw. But in spite of this need, the baking was crude and inadequate, perhaps a reason for the internal (and eternal) unrest characteristic of the Balkans.

The backwardness of the poor whites in our southern mountains is in part explained by what one of them once said to me: "We used to raise light bread, but now we have mostly got out of the habit of it and use lard and saleratus." Surely no high civilization was ever raised on a

substructure of saleratus and lard, not even of Majestic baking powder assisted by a butterine.

When people don't need fire to keep warm they do their cooking gingerly, and their baking and their civilization fall off together.

In contrast with the warm world, let us take Norway, a small, cold, barren country where some of the finest people on earth find their homes.

In the summer the people gather wood enough to keep the home fires burning all winter. In the winter they bake their fladbröd. Rye flour is spread out in huge pancakes on a giant griddle, and a thin flat loaf is made which can be folded like a shawl into fan-shaped sections. When cold, it is brittle, dry and very digestible. The heat of the fire is not wasted and the baking goes on all winter, the farming folks stowing away the flat loaves in tiers under the bed. This type of bread may not satisfy every taste, but it is good and wholesome and tons of it are imported every year from Norway and Sweden to restore the jaded stomachs of the tender rich of America.

No use of disputing about tastes, as a thoughtful Roman once observed, but the baker has power to change our tastes. That is part of his art, and I wish that he would do his part towards displacing white flour with products of the whole wheat, so much more wholesome, digestible, and with most people agreeable to the palate.

Every great enterprise should lead in some great reform and whole wheat points

its fingers in the direction of least resistance and greatest usefulness.

Another View

We are glad to print the above article by Dr. Jordan, including its praise of whole wheat or graham bread, because everybody is entitled to his own tastes. Scores of bakers, however, who have gone in for dark breads have found that public demand forced them back to white bread. Dr. Jordan is a highly valued authority, but will he pardon us if we turn back in the pages of his life to the days when he was a pioneer student in Cornell?

There, possibly, he had the same instinctive reaction to breads that accounts for the widespread use of white bread today in communities where people can follow the appetite appeal to any kind of bread.

In his freshman year Dr. Jordan helped form a boarding club known as "The Strug." That was a shortened form of the phrase "The Struggle for Existence" which the evolutionists were just beginning to use. In Dr. Jordan's memoirs he tells of his boarding-house difficulties at "The Strug." And he tells of his plaint in verse:

Once we were blithe and gay,
Sang like a bird all day,
Fed on hot muffin;
Turkeys our table graced,
Oysters appeased our taste
Served up as stuffing.

O for a biscuit white,
Such as our sisters bake!
O for the doughnut light,
Such as our mothers make!
Even a wedding cake,
That were variety!

But no, 'tis graham bread,
Beans, peas, and graham bread,
Parsnips and graham bread,—
Larup and graham bread,—
So, till we're gray and dead,
Dead from Satiety!

How many other brown bread users

have cried like this for white bread for a change?

The baking industry today, through its leaders, is working towards bread variety and leaving the choice of favorite with each consumer. Probably nowhere are bakers dictating rather than following the public taste in its bread ration.

A Salesman's Record

WHATEVER you may think of laws providing that stale bread shall not be returned to bakeries, every baker likes to see the "return of stales evil" kept down to a minimum.

Perhaps it is because of this idea that President Korn of the American Bakers Association has posted the photograph of a certain bread salesman in his Davenport bakery. President Korn has labelled the picture, "The Champion Bread Salesman of the World." What made him so was that he scored a remarkably low record in the matter of accepting back stale bread.

This salesman is Paul Mingl, Route 32 for the Pacific Baking Co., Los Angeles. He has worked for the company just one year. In that year he kept a careful set of books and he sent, voluntarily, to the company at the end of year a report on his sales and return of stales.

He reported that during the year he did a business as route salesman of \$35,603 and that "as to returned bread on Saturdays and holidays I had in the twelve months only 48 loaves turned back on my hands."

Mr. Mingl's score was 99 per cent in the matter of the stale bread.

Where else in America is there a bakery route salesman to match with him? If you know one send in his record. The industry owes him honorable mention and recognition as one of its most worth-while members. President Korn so states, and most of our members will agree with him.

Economy in Oven Steam

How Scientific Control Will Lower Bakers' Fuel Costs

By MARK B. BEATTIE

Mechanical and Electrical Engineer, St. Paul, Minn.

THE average baker when asked, "How do you know that steam is getting into your ovens?" will generally answer, "Why, we listen to the hiss of it, of course." When asked, "What pressure do you use to get it into the ovens and why; and what kind of an arrangement have you for getting it there?" will almost invariably answer by stating some pressure between fifteen and ninety gauge and that he puts it into the ovens through a sort of a tee on the steam pipe, drilled with small holes pointing to the oven. If you ask him, "Why have the small holes, or any holes at all?" he will generally answer, "That's an absurd question, it is to get the speed out of the steam so it will get back of the oven, of course."

I propose to explode some popular viewpoints which seem to be held by the trade in general; and give you some practical facts to use in every-day commercial practice, which will save money, in many cases saving a pile of it.

The general idea seems to be in the trade that in order to get steam to the back of the ovens, one must have a very high pressure in the steam pipe in order to place it there, and the speed of the steam in getting into the oven depends on the pressure in the pipe and on small holes. These are mistaken impressions.

The velocity at which steam leaves the nozzle into the oven is the same no matter what the size of the opening as long as the external pressure outside of the pipe is less than 58 per cent of the pressure in the pipe. In other words, the speed of the steam getting out of the pipe into the oven is the same, no matter what the size of the hole is.

Ovens are under atmospheric pressure.

The velocity of outflow into the atmosphere from, for instance says 25 pounds gauge, down to say five pounds gauge, is approximately 865 feet per second, as the steam leaves the nozzle, no matter what the nozzle may be in area. The velocity is to all intents and purposes entirely uniform for all sized holes.

But, the QUANTITY of steam in pounds weight, depends on the size of the hole and the pressure in the pipe. Those two factors are the important ones, and the vital ones.

Steam and Water

With the pipe in the same position in the oven, the steam will shoot just as far into the oven and just as fast out of the nozzle, with the steam at five pounds pressure as it will at twenty-five pounds pressure; but, the QUANTITY in pounds weight will differ.

Steam is only water in another form, and it is introduced into the oven for humidity. An oven is heated at the beginning with heated air. It is common knowledge that the hotter the air, the more moisture it can hold in suspension. For instance, at ten degrees Fahrenheit, air can hold only 1.1 grains of water to the cubic foot to the point of saturation. At thirty degrees Fahrenheit, it can hold 2.19 grains, or nearly three times as much water. At seventy degrees, 7.94 grains, or nearly eight times as much. At one hundred degrees, 19.12 grains or nearly twenty times as much, while at 212 degrees it can hold 265 grains, two hundred and thirty times as much as it can hold at 10 degrees and thirty-four times as much as it can hold at seventy degrees.

Now consider the temperature of a bake oven running around 450 degrees. At this temperature, the capacity of the air in the oven to take up water is virtually unlimited. When the steam is introduced into an oven it mixes with the air and the weight of vapor that can be mixed with one pound of air at the oven temperature is substantially infinite.

The baker cannot see the steam in the oven at all except at the door where it cools off enough to condense, since when it is shot into the oven it is invisible in the first place, and goes into a temperature much

which can flow out of a pipe, consider an oven 16x16 by a foot high. The cubic contents is 256 cubic feet.

Steam at 25 lbs. gauge, has 10.3 cubic feet to the pound; at 15 pounds gauge, 13.6 cubic feet to the pound; at 10 pounds gauge, 16.1 cubic feet to the pound and at 5 pounds gauge, 19.9 cubic feet to the pound.

Supposing it is simply desired to fill the oven with steam (neglecting the capacity of the heated air to absorb moisture) a moment with a pencil will show that it will take 13 pounds weight of 5 gauge steam,

FLOW OF STEAM

15 Pound Gauge						
Size Pipe	Area in sq. in.	Lbs. per second	Lbs. per minute	Lbs. per hour	Lbs. per coal hour	Cost coal
1/8"	.0122	.005176	.31	18.63	2.32	\$0.00928
1/4"	.049	.0207	1.242	74.52	9.32	.03728
3/8"	.1963	.08328	4.99	299.8	37.4	.1496
1/2"	.4417	.1874	11.244	674.64	84.	.336
1"	.7854	.3333	19.99	1199.88	150.	.60
1 1/4"	1.227	.5206	31.23	1874.16	235.	.94
1 1/2"	1.767	.7495	44.97	2698.2	336.	1.344
10 Pound Gauge						
Size Pipe	Area in sq. in.	Lbs. per second	Lbs. per minute	Lbs. per hour	Lbs. per coal hour	Cost coal
1/8"	.0122	.00436	.261	15.69	1.96	\$0.00475
1/4"	.049	.0157	.922	59.5	7.5	.03
3/8"	.1963	.070	4.2	252.0	31.5	.126
1/2"	.4417	.157	9.92	595.2	74.5	.298
1"	.7854	.281	16.86	1011.6	126.5	.506
1 1/4"	1.227	.437	26.22	1573.2	192.	.768
1 1/2"	1.767	.63	37.8	2268.	284.	1.136

hotter than any temperature due to any steam pressure he can use. Therefore, the baker to insure that steam is getting into the oven listens for the hiss of it. If he hears a hiss that he thinks due to high pressure, he feels he is getting it in fast, he does not figure it any other way as a rule.

Guessing at the Flow

It is his habit to let his ear make him guess at the flow, but one can't tell by the ear what quantity is flowing. The QUANTITY makes a sound like dollars and the baker generally can hear a dollar getting away from him in any other part of the shop.

To visualize the quantity of steam

16 pounds weight of 10 gauge steam, 19 pounds weight of 15 gauge steam, and 25 pounds weight of 25 gauge steam. Since it is HUMIDITY which is wanted in the oven it is obvious from the pencil results that the most economical thing for the baker to do is to get the MAXIMUM number of pounds of water into the oven at the minimum pressure he can obtain.

Relationship to Fuel Costs

Take as an example two commonly used gauge pressures, 15 and 25 pounds. Supposing your boiler evaporates 8 pounds of water for every pound of coal you burn and that your coal costs \$8.00 per ton as fired. The velocity of steam flowing into the oven will be 865 feet in all cases, but

the QUANTITY of flow will be as shown table on page 119.

Humidity Control

The thing needed in the oven is QUANTITY OF STEAM FOR HUMIDITY and if it can be gotten into the oven at two pounds pressure at the same speed leaving the nozzle at two pounds pressure instead of twenty pounds pressure, the baker is vastly better off in dollars and cents on his cost of getting it there.

For instance, select a $\frac{3}{4}$ " pipe of .44170 sq. inch in area discharging into the oven. Under the various steam pressures before specified, the flow would be as shown in table herewith:

Gauge pressure	Lbs. per minute, flow	Lbs. per hour	Lbs. coal per hour	Cost coal
5	7.45	447.00	55.8	\$0.255
10	9.92	595.20	74.4	.298
15	11.24	674.40	84.4	.336
25	21.73	1303.8	162.7	.651

If, in the use of the steam in the oven common practice is followed of letting the steam flow into the oven for five minutes before the charge, at full valve opening, then throttling down the flow to a quarter of that amount for say twenty minutes for color to appear; the total steam used for the operation would be from the foregoing $\frac{3}{4}$ " pipe table:

Gauge pressure	Total flow in 5 minutes full opening	Total flow in 20 minutes at quarter	Total flow per bake
5	37.25	37.25	74.50
10	49.60	49.60	99.20
15	56.20	56.20	112.40
25	108.65	108.65	217.30

Our oven in the example has only a content of 256 cubic feet. Reducing the total steam flow in the last table to cubic feet of steam which was contained in the various totals, there has been passed into the oven:

Gauge pressure	Cubic feet pound of steam at the gauge pressure	Total volume which has passed into the oven in the baking	Ratio of volume of steam to volume of oven
5	19.9	1482.55	58 to 1
10	16.1	1597.12	63 to 1
15	13.6	1528.64	60 to 1
25	10.3	2238.40	87 to 1

Ignoring the capacity of air to absorb moisture and assuming that the entering steam simply displaces the air of the oven so that there is nothing but steam therein at atmospheric pressure, it is obvious that the last pressure of the tabulation fills the oven many times over.

Chances to Economize

It will pay every baker to install a steam gauge on his oven line and a reducing valve so that the steam pressure thereto can be controlled.

If in addition thereto he will apply this simple rule to calculate the flow into his ovens, namely:

The flow of steam in pounds per minute

out of a nozzle into the atmosphere is equal to the area of the nozzle in square inches, multiplied by the gauge pressure plus fifteen, that product to be multiplied by six, and that final product divided by seven—the result will be the quantity flowing.

The supply lines to the various ovens should be of course large enough to carry

is not large enough to pass the quantity desired it can be enlarged at a nominal expense and this expense will be a small item which will bring large dividends in steam saving.

The baker no longer sticks his hand in a dough to guess at its temperature, he uses a thermometer; he no longer "guesses" that the ovens are hot enough, he takes accurate temperatures; he no longer hits and misses at quantities and materials, he weighs and measures them. He should apply this same system of accuracy to the steam supply to his ovens and when he does he will not receive his reward in the next world, but will get it instantan from his coal pile and overhead.

Cut down the steam pressure and the size of the bill will take care of itself. It pays.

Is Ice Cream National Food?

IS Ice Cream the national food dish of America? No baker can have watched the phenomenal changes in the methods of ice cream manufacture and salesmanship and deny that in this field real organized power has been translated into selling practise. The ice cream manufacturers have learned to work together to "glorify the product," and maintain separate brands as well. They have treated the public fairly in that they have guaranteed the sanitation essential to the making and handling of the product. They have won public confidence and public respect.

In fact they have traveled the trail the baking industry is following along. To the Baker and Confectioner, published at Toronto, Canada, we are indebted for an article by Roberts Everett, secretary-manager of the Ice Cream Supply Men's Association. In this article Mr. Everett told of the transformation recently brought in the public attitude towards ice cream. We

call attention to it because the baking industry has so much work of the same character to do, as soon as its members learn how to really support their National and release it, well funded, to achieve the the work there is to do.

"Ice cream used to be a holiday treat," the secretary-manager of their association writes, "and then it became a once-a-week indulgence. Now it is THE American Industry. They eat it down in Florida, in Saskatchewan, in Maine, in Arizona. It is being delivered by aeroplanes to warships at sea and sailors of the U. S. A. top off their mess with it. It is sold from street cars, wagons, stores, at fountains, in restaurants, in hotels, in clubs, and even in theaters in the form of Eskimo pies.

"The lady and the wash woman both like it. It is sold over limits as wide as the Nation itself. It is just as national as George Washington, and it is just this because it is a truly nutritive food confection."

What ice cream is to the national tea table and dinner table, toast can become to the national breakfast table. See the articles about the American Institute's plan to make it so, and then plan to do your part in the work outlined.

Raisin Bread Standard

T. F. Naughtin, of Omaha, writes to ask if there is any standard on raisin bread. The U. S. Government has promulgated one just as it has on other types of bread. As set forth in Food Inspection 188 it provides that "Raisin bread is any bread obtained by baking wheat bread dough to which have been added sound raisins in quantity equivalent to three ounces for each pound of the baked product and which may contain proportions of sweetening and shortening ingredients greater than those commonly used in Wheat Bread dough."

A Baking School Experiment

Students Find Many Factors Involved in Baking of Stiff and Slack Doughs

A BAKING chemist of wide experience in a modern bakery, set down a rule, in a talk to the American Institute's School of Baking students, that would surely guide any research student to the cause of trouble in a loaf of bread.

The rule was to keep all conditions, except a single one, exactly the same in batch after batch of dough. Then, by altering a single condition at a time, the cause of any special trouble would surely be clarified as experiments progressed.

This rule has become a basic one in the Institute's School of Baking. To determine conditions involved in stiff and slack doughs, for instance, conclusions were arrived at by many students working independently and by several classes working independently. This paper is a discussion of stiff and slack doughs as studied and then averaged up so that individual discrepancies have been minimized.

As a report of stiff and slack doughs it is published for the benefit of bakery foremen and others interested in bake shop problems. It is intended to be the first of a number of reports on bake shop problems.

Formula—In this experiment on stiff and slack doughs six loaves were mixed, with varying amounts of water from 54 to 64 per cent, all other ingredients remaining the same. The standard formula is as follows:

	Percent	Grams
Flour	100.0	325.0
Water	*58.0	189.0
Sugar	3.08	10.0
Salt	1.7	5.5
Yeast	3.68	12.0
Shortening	2.0	6.5

* Normal.

Yeast—To overcome in part possible nonuniformity of yeast quality or errors in weighing, a large quantity of compressed yeast is suspended in water, so that 100 cc. of the suspension may be measured off which will contain the 12 grams of yeast, plus 89 cc. of water. When adding the water allowance is made for this 89 cc. added in the form of yeast suspension.

Temperature—The temperatures of water and yeast solution are controlled so as to bring the temperatures of the mixed dough up to 80° Fahrenheit.

Fermentation—The doughs are allowed to come up full on the first punch. The time of the second punch is taken as half the interval from the time of mixing to the time of the first punch. The time to the bench is taken as one-third of the time interval from the first to the second punch. The total fermentation period is the total number of minutes' fermentation from the time of mixing to the time to the bench. This is always equal to $1\frac{2}{3}$ times the interval from the time of mixing to the time of the first punch. The figures for total fermentation period in this experiment show a gradual drop as the dough becomes softer. That is, the softer the dough the shorter the fermentation. The curve, therefore, shows a steady drop from 229 minutes at 54 per cent absorption to 192 minutes at 64 per cent absorption.

This is to be expected because the yeast has a better opportunity to function in a soft dough than it has in a stiff dough. The enzymic activity is probably greater and the gluten certainly develops faster when in a softer state. These facts are taken advantage of by the bakers who run

sponge doughs, making the sponge slightly softer than the dough in order to give the yeast a better chance to become very active before the dough is mixed. The same principle applies in the use of a primary ferment, which is usually made very soft and sometimes almost liquid.

Yield—A study of the yield curve will show a gradual rise from a stiff dough to a slack dough with a tendency for it to flatten out horizontally as the dough becomes very slack. Yield is calculated on

the basis of one pound loaves per barrel of flour. By increasing the absorption the weight of dough is raised for the same quantity of flour. The flattening of the curve shows that beyond a certain point further additions of water will not increase the yield, as excessive amounts of water are lost during baking if the loaf is properly baked out.

Volume—The figures show that we obtain the best volume with the normal stiffness of dough and a stiffer or a slacker

EFFECT OF VARYING STIFFNESS OF DOUGH

Number of Dough—	1	2	3	4	5	6
Formula—Flour	GMS. 325	325	325	325	325	325
Sugar	GMS. 10	10	10	10	10	10
Salt	GMS. 5½	5½	5½	5½	5½	5½
Yeast Solution (or yeast).....	CC. 100	100	100	100	100	100
Water	CC. 86½	93	99½	106	112½	119
Shortening	GMS. 6½	6½	6½	6½	6½	6½
NORMAL						
Absorption of the flour.....	% 54	56	58	60	62	64
Temperature of Room.....	.....	.....	.....	.....	.....	.....
Humidity of Room.....	.....	.....	.....	.....	.....	.....
Temperature of Flour.....	.....	.....	.....	.....	.....	.....
Temperature of the Yeast Solution.....	.....	.....	.....	.....	.....	.....
Temperature of the Water.....	.....	.....	.....	.....	.....	.....
Temperature of the Dough.....	°F 78.4	79.4	79.8	79.9	79.7	79.5
Weight of the Formula.....	GMS. 533.5	540.0	546.5	553.0	559.5	566.0
Weight of the mixed dough.....	.....	.....	.....	.....	.....	.....
LOSS IN MIXING.....	.....	.....	.....	.....	.....	.....
Time when mixed .....	.....	.....	.....	.....	.....	.....
Time of First Punch .....	.....	.....	.....	.....	.....	.....
Time of Second Punch .....	.....	.....	.....	.....	.....	.....
Time to Bench .....	.....	.....	.....	.....	.....	.....
Time to Proof Box .....	.....	.....	.....	.....	.....	.....
Time to Oven .....	.....	.....	.....	.....	.....	.....
Temperature of Oven .....	.....	.....	.....	.....	.....	.....
Time out of Oven .....	.....	.....	.....	.....	.....	.....
TOTAL FERMENTATION PERIOD.....	MIN. 229	225	210	200	199	192
Weight of loaf one hour from oven.....	.....	.....	.....	.....	.....	.....
CORRECTED WEIGHT OF LOAF.....	.....	.....	.....	.....	.....	.....
YIELD (1 lb. loaves per bbl.).....	276.0	281.5	284.5	287.0	289.0	290.4
Volume of the loaf in cc. ....	.....	.....	.....	.....	.....	.....
CORRECTED VOLUME OF THE LOAF.....	.....	.....	.....	.....	.....	.....
Score of Loaf—Volume	10 8.7	8.9	9.1	9.1	8.9	8.7
Color of Crust	8 6.9	6.8	7.1	6.8	6.7	6.8
Symmetry of form	3 2.1	2.2	2.2	2.2	2.2	2.2
Evenness of bake	3 2.2	2.3	2.3	2.3	2.2	2.3
Character of crust	3 2.1	2.2	2.3	2.3	2.3	2.4
Break and Shred	3 1.9	2.1	2.4	2.2	2.3	2.2
Grain	10 8.2	8.1	8.6	8.5	8.3	8.1
Color of crumb	10 8.7	9.0	8.9	8.6	7.9	7.9
Flavor	15 13.0	13.4	14.6	13.4	13.4	13.0
Taste	20 17.4	17.5	18.0	16.3	16.1	15.9
Texture	15 13.0	13.4	13.8	13.2	12.9	12.8
Remarks .....	.....	.....	.....	.....	.....	.....
TOTAL SCORE OF LOAF	84.5	85.9	89.3	85.0	83.2	82.3
General Remarks .....	.....	.....	.....	.....	.....	.....
.....
.....
Record Sheet, Exp. Bkg. Lab.	Name					

dough gives a slightly poorer volume. The stiffer dough offers more resistance to the pressure developed by the expanding gases in the oven and will tend to hold back the expansion of the loaf. The slacker dough, on the other hand, does not offer resistance enough, and allows more of the gas to escape and the gas cells to enlarge and so causes poorer volume than the dough of normal or proper stiffness. The stiffer dough retains the gases in smaller, more uniform cells, producing a more even spring in the oven.

Color of Crust—This characteristic is but slightly influenced by the stiffness of dough.

Symmetry of Form—This factor is influenced mostly by the molding of the dough and in the case of this experiment shows no difference between the loaves.

Evenness of Bake—Here again the experiment has no bearing on this feature of the loaf since it depends mostly on the oven conditions.

Character of Crust—The character of crust is slightly improved with a slacker dough, although the difference is small. The crust tends to become more tender and pliable as the dough is made softer.

Break and Shred—This point depends

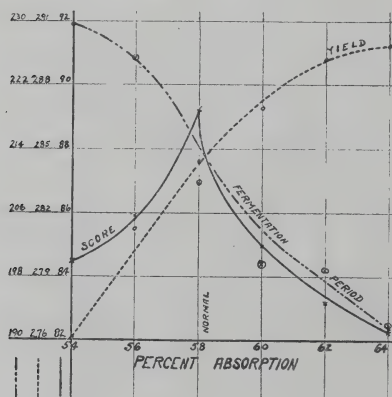
largely on the details of handling, such as proof time, oven temperature, molding, etc., and these experiments show no appreciable effect on this characteristic of the loaf.

Grain—The best grain is obtained with the normal stiffness of dough. The slack doughs have a tendency to produce an open grain, becoming rather apparent after the point of normal stiffness is passed. Even a slightly soft dough will show a poorer grain than one with the correct amount of water, the cells becoming very much larger and the whole grain coarser.

Color of Crumb—The color of crumb is affected by the varying stiffness of dough in rather a peculiar way. The slacker doughs have a much greater effect on the color of crumb than the stiffer doughs. Although the normal dough or a slightly stiff dough gives the best color of crumb, the difference is much more pronounced in the case of the soft doughs. This may be partly accounted for by the poorer grain which always has some effect on the color of crumb.

Flavor and Taste—The physiological effect of flavor and taste are closely related to each other. They are both affected to a marked degree by the character of fermentation, slight changes of flavor being more noticeable than those of taste. Thus it is to be expected that differences in the stiffness of dough, altering the fermentation rate, will affect the flavor and taste of the loaf. The best flavor is undoubtedly obtained from a dough of normal stiffness. Increasing slackness of dough appears to lower the score for taste more rapidly than one which is too stiff. This is noticeable in the comparative scores.

Texture—This quality of the loaf follows closely the change in score for taste and flavor. The slacker doughs give a



poorer textured loaf than the stiff doughs, with the best texture for the normal dough.

Total Score—Without doubt the best loaf is obtained by the use of the normal stiffness. It is noticeable, however, that a difference of 2 per cent in absorption on the side of stiffness makes less difference in the total score than the same amount of water in excess of normal.

Conclusions

This experiment proves that there is enough constant difference between the loaves baked from doughs of different stiffness to enable the baking students to consistently obtain results, scores, and curves which are similar in character. The final scores of these loaves are highest for those made from doughs of normal absorption, while the same percentage of additional water above normal results in a more pronounced decrease in score than the corresponding stiffness. While the shorter time of fermentation times and yield favor the slacker (softer) doughs, the internal characteristics of color, texture, flavor, and taste are better in the normal or slightly stiff doughs.

A New Bread Law

NORTH DAKOTA is the latest state to enter the Standard Weight Law lists. It follows Washington, which recently adopted the Oregon law. Probably it precedes Kansas, where an ardent discussion is now in progress as to the advantages of Standard Weight legislation.

The attention of bakers who are drafting Standard Weight bills might well be called to the odd provision here that "the average weight of loaves shall be as often above as below any permissible weights."

The new North Dakota measure is as follows:

Section 8, Food and Drug Act: Bread, How to Be Sold: It shall be unlawful for any person to sell, offer or expose for sale

or to have with intent to sell or transport any bread, the loaf of which is not one of the following weights: sixteen ounces; twenty-four ounces avoirdupois or any whole multiple of sixteen ounces avoirdupois. The weights shall apply alike to each unit of twin or multiple loaves. Any loaf shall be of the required weight at any period from the time of baking until twelve hours thereafter. The above required weight standards shall apply alike to wheat bread, white bread, milk bread, rye bread, raisin bread, currant bread, brown bread, graham or whole wheat bread and other similar kinds of farinaceous substances baked in loaves and known and designated by the trade as bread. The average weight of loaves shall be as often above as below any permissible weights. Provided, that the weight standards defined in this section shall not be construed to apply to cake, buns, biscuits and similar small unit products.

The School's Value

Our Mr. Oluf Petersen, who graduated from American Institute of Baking recently is very enthusiastic about the institute, its officers and teachers, in fact, all of its work as now carried on. And, as far as we are concerned, we are willing to testify that the three or four months' stay of Mr. Petersen at the Institute has been of marvelous benefit to our superintendent.

What he has learned at the school is reflected in the product which we turn out; he is not guessing any more. He knows. We are going to give him a laboratory where he can analyze his product and undertake research work. We are willing to admit that sending him to take this course has not been an expense at all but a very fine investment.

P. F. PETERSEN,
President, the Petersen & Pegau Baking Co.,
Omaha, Nebraska.

Books for the Baking Laboratory

FOODS AND THEIR ADULTERATION. Dr. Harvey W. Wiley. P. Blakiston's Son & Co., Philadelphia, Pa. 646 pp. Price, \$5.00.

In the third edition of his notable book on *Foods and their Adulteration*, Dr. Wiley has collected for the student of foods and food analysis all available facts which have any bearing on the preparation, possible adulteration, and economic use of the foods which find their way to the American table.

Earlier editions contained the rules and regulations for the enforcement of the Food and Drugs Act and the original standards for food as set by the Department of Agriculture. The third edition omits these sections and adds a discussion of the new principles that have been discovered in the use of foods. Part XIII briefly discusses the recent vitamin discoveries.

Students of baking science will find Part V, which treats of the Cereal Foods, full of interest. No food chemist or writer on the subject of nutrition has a fuller knowledge of the value of bread in the diet than Dr. Wiley and while many investigators cannot agree with his conclusions as to the relative value of whole wheat and white bread, on the whole they may be accepted as sound. No baker will find any reason to object to the statement that "the baking of bread is an art which is most successfully practiced by professionals, and the American method of home bread making does not always lead to the happiest results."

In another paragraph which discusses the economic value of the cereal diet the author says "where economy is to be considered—the food will be chiefly cereals in the form of bread or other appetizing preparations, with milk only for the children, and meat, vegetables and fruits in moderation." "A diet of plain, unprepared cereals will do more for the poor than politics, grammar or geography." In these days of high taxes, high rents, higher living costs in every direction, such advice should be generously given.

Some of the baking practices discussed are evidently those of earlier days and later editions will no doubt omit the reference to "a lower grade of flour known as 'bakers' flour,'" for the modern baker buys the best flour obtainable and the old grade known as "bakers' flour" is no longer used by him.

The discussion of bread formulas is also historical rather than in accord with modern prac-

tice. No mention is made of the general use of condensed and dry milks in bread formulas and the only formula given and which is described as "very good" contains no shortening, no sugar, no diastatic malt syrups and no yeast foods, all ingredients which aid materially in building up the nutritive value of the modern baker's loaf.

In discussing the harmfulness of baking powder residues the author says, "It would be better evidently, if all people used more yeast bread and less baking powder rolls." The use of chemical reagents for leavening bread is not as advisable as the use of ordinary fermentation."

This volume by Dr. Wiley precedes one which many of his friends look forward to as a crowning effort of his long life of service. Dr. Wiley's *Memoirs* are expected out shortly. In the *Memoirs* of David Starr Jordan, whose life in some phases paralleled that of Dr. Wiley, he refers to Wiley as his own "discoverer" and sets forth that Dr. Wiley once referred to him (Jordan) as "my greatest chemical discovery." Dr. Wiley was one of the early advocates of the American Institute of Baking. When the Institute was first opened he declared that "Ceres had pushed Gambrinus off his throne and would now rule as its occupant."

BEVERAGES AND THEIR ADULTERATION. Dr. Harvey W. Wiley. P. Blakiston's Son & Co., Philadelphia, Pa. 421 pp. Price \$5.00.

Food chemists and all persons who have followed the progress of pure food control as it has developed under the leadership of Dr. Wiley have long waited for the publication of his discussion of beverages. This volume is in the nature of a supplement to his earlier treatise on *Foods and Their Adulteration* and adds many interesting chapters to the literature of waters, soft drinks, fruit juices, and tea, coffee and cocoa. It is unfortunate, however, that the chapters which deal so fully with fermented and alcoholic beverages can only be read by American chemists as interesting historical discussions of drinks no longer found outside of the literature of the ages.

Dr. Wiley was the center of the fierce controversy over "What Is Whisky?" and his masterly defense of his belief that whisky was the product of the distiller rather than that of the rectifier carried the issue through courts and cabinets and even to the council chambers of presidents.

Everyone who has more than a passing interest

in the development and enforcement of food legislation will find the chapter on whisky well worth the reading.

The development of water purification methods is adequately handled as is the discussion of fruit juices, the soft drinks and tea and coffee. The author gives water, "the typical beverage," the place of honor in his interesting volume.

H. E. B.

THE DETERMINATION OF HYDROGEN IONS. By W. Mansfield Clark, M.A., Ph.D. Formerly Chemist, Research Laboratories of the Dairy Division, United States Department of Agriculture, Professor of Chemistry, Hygienic Laboratory, United States Public Health Service. Second Edition, 480 pp., Williams & Wilkins Co., Baltimore, 1922.

It is not often that a scientific work intended for the use of specialists is reprinted after a year and then revised and extended to a second edition to meet the constant demand for it within another twelve months.

The second edition of Clark has been extended from 312 pages to 480 and the invaluable bibliography now includes about 2,000 references instead of 1,000 for the first. The author has done his work well and his book will probably remain for some time to come the standard treatise on this subject.

The importance of the determination of hydrogen ions for the chemist and biologist in the baking industry was first studied by Jessen-Hansen in 1911. Since then considerable work has been done by others in the investigation of the relation of this factor to the complex conditions of panary fermentation and "flour strength." Like many other new conceptions, hydrogen ion concentration has been somewhat overworked by some who have hobbies to ride, and unduly emphasized by others as the ultimate touchstone of all there is to know about why some flours are weak and others strong.

The optimum hydrogen ion concentration is undoubtedly of great importance in panary fermentation, in its relation to yeast action, and other activities due to enzymes, as well as to the hydration capacity of the wheat proteins and the resulting viscosity of the dough. Acidity is the one factor in fermentation which is the most readily controlled, but why some flours have higher baking qualities than others cannot be predicated on the basis of a certain optimum hydrogen ion concentration. We need more light on the enzymes of proteolytic activity before we can go very far with an explanation of the effects of certain types of flour in breadmaking.

The second edition of Dr. Clark's book ought to find a place in every baking and milling laboratory.

C. B. MORISON.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Determination of Chlorine in Bleached and Natural Flour. O. S. Rask. J. Assoc. Official Agr. Chem. 6, 68-71 (1922).—The results of a collaborative study of the determination of Cl in flour by two different methods are given. The materials used consisted of unbleached and chlorine-bleached portions of a hard-wheat patent flour milled in a commercial mill under the writer's supervision.

RUTH BUCHANAN.

Determination of the Volume of Bread. Arpin and (Miss) T. Pécaud. Ann. fals. 15, 394-8 (1922).—Carefully fill the cavities, fissures, etc. with 60 grams of clay, apply with a brush a coat of a solution of rubber with benzine, let dry, spray on a thin coat of cellulose acetate (in ΔmOA_2), dry by means of compressed air, insert an iron rod provided with a handle (applying clay where the rod enters the bread), and carefully lower into a vessel of water filled to overflowing. Collect the overflow in a graduate. The rate of immersion should be as rapid as possible and depends on the rate of overflow (generally 25 to 30 seconds). As soon as the overflow stops, withdraw, wipe and reweigh the bread to find the amount of absorbed water (usually 5 to 10 grams); add this to the amount of overflow. As the varnish is very thin, the operation can be repeated but once. Duplicates carried out the same day showed differences of 3 to 19 grams per kilogram of bread. The method is useful for comparing breads from different flours, but baked together.

A. P. C.

Estimation of Starch in Barley and Wheat. A. J. Ling. Chem. News 125, 346-7; Chem. Age (London) 7, 790-1 (1922).—Ground barley or wheat is extracted for 3 hours with alcohol of d. 0.920 to remove some of the proteins. It is then converted into a paste with hot water and treated with the extract of a malt of known diastatic power for an hour. The maltose is estimated and the starch calculated by the formula: $S \text{ equals } 94.73M'/M$, in which S is the percentage of starch in the sample, M is the percentage of apparent maltose produced from dry barley or wheat starch by the action of malt extract from malt of a definite diastatic power, and M' is the percentage of apparent maltose produced from the sample and with malt of the same diastatic power. The values 63.9 and 64.0 were obtained as the percentage of starch in wheat.

RUTH BUCHANAN.

Building Up a Quality Loaf

IS THERE anywhere a baker who doesn't have a problem in which scientific help would be of great avail?

Hundreds of loaves of bread have arrived at the American Institute during the past month in which the dough was underbaked so much that it was half raw. Scores of loaves arrived in which the doughs were too old. These two evils, it seemed, were widely distributed over the industry for sample loaves came from almost every state in the union.

There is a fine chapter to the story. It is that after working over these bad loaves and offering suggestions to their bakers, the next shipments improved in every case but one. In that one case the baker made an old dough and kept right on after he had been told four different times that he was knocking down bread quality by the practice.

In many instances bread was so improved toward a quality ideal that the score jumped up in a few weeks from an average of 80 to an average of nearly 90. In those weeks ovens were overhauled to do away with a surplus or a deficiency of top heat, formulas were altered to get thinner crusts and better taste and flavor, and baking and fermentation periods were reformed to conform to the best modern practice.

On the Pacific Coast, at Tacoma, a baker got a score of over 96. It had been earned by a careful process of upbuilding the loaf.

Are you receiving this free service, given in the interest of quality baking by those associated in the belief that quality baking is the industry's salvation?

Here are the states from which bread was passing under the tests of our research and service chemists when these words were written: Illinois, Montana, South Carolina, Iowa, Colorado, Oregon, Miss-

issippi, California, Alabama, Indiana, Washington, Wisconsin, New York, Oklahoma, Nova Scotia, Georgia, Florida, Tennessee, Iowa and Texas.

Here surely is the proof that American Bakers Association has slender tendrils running over all sectional lines and into the heart of every American baking problem.

In one section a baker's trade called for a thin tender crust. In spite of all he could do his bread came out with a thick, tough crust. He was informed that his oven was "off?" in that it suffered from too much top heat; that he used too much malt and too much sugar. He corrected his formula. Now both he and his customers are happy.

Another baker sent in loaves he admitted were a disappointment. Both were musty. "Bad flour storage conditions," he was informed at once. His flour is now on the way here for test.

A baker resented reports that his taste and flavor were "off." He was advised to correct his time of fermentation. He did so and now he is glad he did it.

The letters coming in from those who receive the Bread Scoring Service are alone worth to the staff who have built up this service, all the toil and labor it has taken to introduce it. A baker suggested it—a baker who knew how to use his institute and what the needs of the industry were. He saw more than the vision of himself surrounded by a few competitors who in some way he must down or thwart to get along.

"In our small business," writes Harry K. Geist of Grand Forks, N. D., "I regard Baking Technology alone to be worth the price of membership, besides your wonderful bread scoring service. Are you getting your share of it?"

BAKING TECHNOLOGY

*A Journal of
Applied Science
in Baking*



*Published by
The American Institute
of Baking*

VOL. II

CHICAGO, ILLINOIS, MAY 15th, 1923

No. 5

Broadcasting Bread's Story

A MONTH ago United States Senator Royal S. Copeland of New York declared that the movement to restore basic prosperity to American farms, through increasing the American consumption of wheat, was the greatest American thought "since the first Liberty Loan." This great movement, concentrated under the slogan of "Eat More Wheat" has now a month's range

through American affairs. Before the writer as these words are penned, are piles of newspaper clippings. Newspaper editors, America over, have written more about wheat and prosperity and bread as the

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great medium of wheat consumption, than they ever have written in years. Practically every one of these newspaper editors joins his voice in a swelling of harmony, instead of merely an aggregation of different singers, each with his own individual song.

Some important new truths have come out of the welter of this remarkable month in the history of the baking industry.

First there is the new

truth that if everybody in America would eat an extra slice of bread per meal, they would be living more economically for they would get the world's best food at the lowest cost in most convenient form.

Next there is the still more important truth that if everybody in America would average a slice of bread, or two ounces of wheat products in any form, per meal, America would still be ONE OF THE SMALLER WHEAT EATING NATIONS.

America, even with this increase of eight billion pound-and-a-half loaves of bread per day, if the 2 ounces of wheat per day additional should all be baked into bread, would still rank behind England, Belgium, and Canada in bread consumption.

These pertinent facts have roused the bakers of America, along with the farmers and the leading statesmen, to one common vision of a great American opportunity. This vision is that a very material increase in wheat consumption is a practical possibility and not a "dream of something up in the air not to be taken seriously by men whose feet are securely planted on the ground."

How Bakers Suffered

As the facts have come pouring out, a clear understanding of how the baking industry suffered during the war because of the national cry, "eat less wheat, save wheat and win the war," has at last reached the leaders of our national life.

Now they know not only how the baker suffered but how, in turn, the punishment of the baker by forcing him to use all kinds of substitutes for good wheat bread, reached over to run a seam of despair through American basic prosperity.

The farmer had his 170,000,000 bushels of wheat pile up on his hands, and there was no market for it. That destroyed not only the farmer, because of a lack of buying power, but it destroyed also such fine institutions as the Consolidated Wagon and Machine Co., of Utah and Idaho. After paying dividends for forty years with hardly a break this institution suddenly reached the receiver's hands, and carried

down in the crash a vast amount of intermountain invested wealth with it.

Now how was the farmer to be pulled up out of his despair, while the baker gained a chance, through concentrated support from many circles that had never even thought of the baker before, to bake eight billion more loaves of bread per year?

Bushel upon bushel of newspaper clippings tell their own story of how the nation has responded to the new vision of its new opportunity.

These clippings tell the story of how the editors realize that America now has an opportunity not unlike that which it had when it sought to Win The War With Wheatless Days.

Help From C. S. Mott

This opportunity is to win the farmer back into the fellowship of successful Americans with WHEATY DAYS.

One little incident will show how the new spirit is at work. Piles of newspaper clippings came in from the publicity effort of a single man who saw what 2 ounces more of wheat products per day, in the American diet, would do for American prosperity. This man turned out not to be a baker or a miller or a pie-man at all. He was C. S. Mott, vice-president of General Motors.

"Within The Empire"

The reaction up in Canada was curious. It demonstrated that there is a movement up that way of "Within the Empire." Translated that movement means a buying of all things "within the empire." Here possibly was a reason why American wheat piled up in part on American hands and found a lessened outlet through export channels.

Russia's New Part

How Russia helped also to dam up the flow of American wheat from American

ports, was clearly shown in reports gathered by the National Research Council. From having a deficit of wheat which caused her people to starve for lack of bread in 1921, Russia produced last year all the wheat she needs and a million tons more. Before the war she exported eight million tons of bread grains, and she has planted her 1923 crop with a view of returning to her former condition. Drouth alone can hold her back. More than that surplus grain is no longer requisitioned in Russia and private trading may be indulged in by farmers raising wheat.

Editors Awakened

This clear understanding of world-wide conditions, and American relationship to them spread throughout the country on the wings of editorial comment from thousands of newspapers. Washington backed up the common understanding with reliable data and statistics of the grain trade.

One Small Incident

One incident, small in itself, shows how men who have never worked together before are putting their shoulders to the plow to cultivate this new field of co-operative action.

The Beaver Valley Milling Co., of Des Moines, Iowa, had gone to the expense of putting up a number of billboards before its officers had caught the new vision.

What did they do? Why they ordered out painters with paint brushes and made over every billboard in their system. They showed some power of adaptability for the new slogan they painted on the boards was "Eat More Wheat, Bread is The Best and Cheapest Food." With this action went whole-hearted co-operation with the campaign in every phase.

The Pillsbury Plan

Down in Louisville representatives of American Bakers Association appeared be-

fore a mass meeting of bakers and millers, meeting together for the first time. There were even self-rising flour millers, who came anxious to know where they fitted in to this program.

With the spokesman for American Bakers Association was a spokesman for the Pillsbury Flour Co., Mr. Titus. Mr. Titus had caught the possible ramifications of this idea and he was glad to expound it, not as a narrow and selfish idea of his company, but as an idea as big and broad as the basis of American prosperity.

Mr. Taggart's Help

Some bakers set up a notion that as bread men they were interested only in advertising that "sold more bread." They were told not to "tip over the larger idea" but to play the bread end up as greatly as they wished in their own advertising, leaving all other manufacturers of wheat products to do the same, each group for itself.

Alex. Taggart in Indianapolis caught this idea and worked for weeks on a full page advertisement on Taggart's bread. It was "keyed in" to the general message to America, and yet "drew the lightning down" into the Taggart bakery and the Taggart product of Quality bread.

Millers Combine

In Minneapolis something revolutionary in the way of co-operative effort was witnessed. Newspapers carried stories of a prize essay on the subject of the importance of wheat to American prosperity. The prize money, it was also advertised, was put up jointly on a 50-50 basis by two large milling concerns of Minneapolis, Washburn-Crosby and the Pillsbury Company.

Tours of Talks

Get any mass of people to conceive an idea and you thereby prove you have hit upon something vital to their life and pros-

perity. When America rose to the idea of WHEATLESS DAYS a national background of war vitalized the idea. Now a national background of demobilized and deflated farmers vitalizes the newer idea of "reversing English" on the war time activity.

For instance Dr. H. E. Barnard, director of the American Institute, and I. K. Russell, of the Institute staff went South to attend a series of bakers' conventions. They were everywhere welcomed with requests that they tell about the meaning of the "eat more wheat movement." They told the story over the radio from Atlanta and Houston, and in the newspapers of New Orleans, San Antonio, Nashville, and Louisville.

Bakers found themselves for the first time meeting in a common session with eager flour men, and men from many allied lines. Even the electrical groups were there, anxious to see what "Make Toast Your Breakfast Food" can mean to producers of electric appliances.

Clubs such as Rotary, the Chamber of Commerce, Kiwanis, Lions, all had on their "receivers" for the broadcasted messages. Our speakers appeared by invitation and were supported from the floor and the dais at each meeting.

In these talks breadless days were scored, as breadless days are now achieved on dining cars and in leading hotels and restaurants. The terrific economic loss to the farmer through the withdrawal of the bread basket from hotel, restaurant and dining car tables was emphasized.

One Speaker's Tour

The experience of one of the modern successors of the "four minute men" of war times, will illustrate the story of all of them.

This young speaker, Captain M. K. Guthrie, started his tour in New England. He outlined the idea to 75 bakers in Spring-

field; then in private talks he outlined it to the advertising managers of the larger baking companies who wanted to specialize the general theme to the best local advantage.

Next he broadcasted the story from Medford Hillside station, then he talked it all over with Herbert Myrick, owner of many farm papers and a National figure in the agricultural world. Mr. Myrick gave bakers probably his first favorable thought. He promised strong editorial support in all his papers and strong news support as well.

Capt. Guthrie next dropped down to New York, where he spoke to several advertising experts who have been retained to develop phases of the general idea for special clients. At a bakers banquet attended by 700 bakers he outlined the general scheme so that all gained an understanding of it.

In Buffalo he outlined it to advertising groups, to the Buffalo Flour Club, the Chamber of Commerce, Hook and Axe Club, and to a grocers' organization.

Grocers Anxious

One of the best reactions came from the grocers. All promised to make special wheat displays in their windows and to stress the patriotic side of the situation in all their advertising. The Statler Hotel Corporation was approached and a promise obtained that they would do all in their power to promote a larger use in hotel menus of wheat products.

The owner of a system of chain stores in Wilkes-Barre, Penn., promised to emphasize wheat products in all the company's advertising.

One Bad Reaction

A farm paper, The Producer, printed to promote co-operative wheat selling, records a plan suggestive of the desperate condition of American farmers. The plan was brought forward by R. B. Griffith of Grand Forks, S. D., in a letter to George E. Duis,

president of the North Dakota Wheat Growers' Association. Mr. Griffith is not a farmer but is owner of the largest department store in North Dakota. He urged that the farmers FEED TO THE HOGS all their surplus wheat, and hold the price steadily to \$1.60 per bushel on all sold.

The question is now, can the baking industry, by pulling on the issue of the farmer's necessity, so do its share that the farmer will not have to face the feeding problem for surplus wheat?

One month's campaigning doesn't of course, afford a correct basis for judging, but above is the story of how the work to this end is progressing.

Food Inspectors Busy

DURING the year just closed the Sanitary Food Inspectors have been busy in most of the states and in all of the larger cities. We have just read with much interest the sanitary food inspection ratings given the bakeries of New Hampshire by Dr. Charles D. Howard, chemist in charge of the Division of Foods of the State Board of Health.

Dr. Howard visited forty-four cities and towns during the year and inspected two hundred and twenty-five bakeries. Of this number fifteen, or seven per cent were in such satisfactory sanitary condition that they were rated "Excellent." One hundred of the two hundred and twenty-five bakeries were in good sanitary condition; ninety-two of the plants were rated as fair, while eighteen were so unsatisfactory that they could only be classified as bad.

It is just such reports as this which confirm the belief of American Bakers'

Association that the baking industry cannot hope to supplant home baking with the products of its plants and shops so long as sanitary conditions are generally as unsatisfactory as are those shown in this New Hampshire report. Bakers everywhere will welcome an aggressive campaign on the part of Food and Sanitary Officials to bring every bakery into the good and excellent class, for every bakery which is rated fair or bad by the Sanitary Inspector is a burden upon the entire industry.

An Example

SMALL communities with small bakeries to serve them are much more common, and probably will ever be so, than large communities with large bakeries at their service. One such small community in Illinois is served by two small bakers. Recently at her dinner table a lady of this town informed the writer that she served her own bread, and that no woman in the town would dare to serve guests a slice of bakers' bread. She said the women's clubs had investigated the two bakeries and had found one so dirty they could not think of using its bread while they had found the other's proprietor so sickly looking they would not use his bread.

Here was a home-baking community, kept so by lack of foresight and understanding on the part of its bakers. Can anyone claim that a liberal application of the Jay Burns Gospel of Sanitation in that town would harm anyone—unless one baker only applied it and won all the trade.

Bread Back in the Dining Car

How Gordon Smith Moved in Mobile to Wake Up Railroad Service to Diet Factor Neglected Since the War

CAN the united effort of those who are trying to undo the work of the war in "taking the eat out of wheat," bring back the bread basket to the center of railroad dining cars?

Gordon Smith down in Mobile thinks that something like that can be done. And he has approached the dining car folks of the roads running through his country with the idea.

We print his letter to them below. There are dining car superintendents in your section, wherever you are. Most of them are strangers to good bread. So are the customers of their roads. At least all of those over which we have travelled.

There is something more than merely winning a new friendship in the dining car service, if leaders of the railroad world will look kindly upon the reversal of policies they adopted when "eat less wheat" was the slogan of the war.

Every field develops some leader who more or less makes the pace. The dining car menu card is reproduced and imitated in hundreds of hotels and restaurants. Often in arguments over alleged excessive costs of some item, the accused hotel man will justify his price by the dining car menu card. Bread went off the dining car tables perhaps earlier than it disappeared elsewhere. Then when special orders were given for bread one was more likely than not to obtain stale bread that was uninviting. It led to a shopping for other dishes which appeared to be more worth the money charged.

From Buffalo General Superintendent Smart of the New York Central Railroad Dining Car Service, operated all railroads

during the war, in his capacity as Chairman of Dining Car Superintendents under Federal Administration. Thus dining car practice became standardized for the whole of America, more or less. Mr. Smart may consent now to a reversal of war time policies which have remained in effect since the great wheat scarcity which brought them about.

In the case of the L. & N. railroad, Gordon Smith found he was served with one of the best meals he ever ate on a diner. That was also the experience of the present writer. So there is no spirit of complaint in the letter making certain suggestions which Gordon Smith wrote to the Superintendent of that line. It follows:

W. G. McEwan, Supt.,
L. & N. Dining Car Service,
Louisville, Ky.

Dear Mr. McEwan:

There is a movement on foot now to promote the interest of the wheat farmer through the sale of more wheat products in the shape of bread, pies, macaroni, crackers, cake, etc.

Our wheat farmers raise about one hundred seventy million bushels of wheat more than this country consumes. There does not seem to be any prospect of selling this wheat abroad as Russia is rapidly becoming a factor in the situation.

I was riding on the Louisville and Nashville dining car on Saturday from Montgomery to Mobile. I am always an admirer of the service performed by the L. & N. dining car people. The food is good and it is served in a cleanly manner by polite employees. As a baker of bread, however, I feel that justice is not being done our prod-

net when stale bread is served. On Saturday we had bread for lunch which is not up to standard, and it seems to me that the dining car service ought to buy bread oftener; that is, for instance, get bread for breakfast at the starting point, bread for lunch in Montgomery, and your dinner bread in Mobile. This might be a little troublesome, but it would insure your patrons' better bread, and they would eat more of it.

It has been said that if every person would eat one more slice of bread at each meal, we can consume the 170,000,000 bushels of wheat which would mean so much to our wheat farmers. Incidentally this would mean a whole lot to the railroads, because to pack that 170,000,000 bushels of wheat would require 40,000,000 yards of cotton cloth, and the south would come in for its share of this through the use of cloth in packing the flour, and through the use of shortening which is made from cotton seed oil.

The railroads will get more from transporting the flour than they will from transporting the wheat. This campaign is going to be definitely launched and everybody interested, the farmer, the transportation company, the miller and the maker are going to be asked to try and sell to the American people this extra 170,000,000 bushels of wheat.

I am therefore writing you at this time because it is fresh in my mind that the bread which was served on our car Saturday was not all it should be, and although our party of four were all interested in the baking business, we did not eat one half of the bread that was served to us, whereas if the bread had been good and fresh, we would have consumed it all and probably would have asked for more.

With very kind regards, I am

Very truly yours,

GORDON SMITH.

Ruling on Bleached Flour

A LONG and painstaking investigation of flour bleaching has been started in Pennsylvania under the direction of James Foust of the Bureau of Foods. This comes as a result of the signing by Gov. Pinchot of the new bill amending the law as to the conditions under which bleached flour may be sold.

In a statement issued jointly by Secretary of Agriculture Frank P. Willits, Attorney General George W. Woodruff, and Director Foust, they set forth the state policy under the amended law as follows:

"The Department of Agriculture will take no action for the present in connection with the manufacture or sale of aged, bleached, or matured flour pending further research and experimental investigations as to whether or not the nutritive value of flour is injuriously affected by such aging, bleaching, or maturing.

"Should later developments disclose that the aging, bleaching, or maturing of flour affects its purity, or makes the flour appear better and of greater value than it really is, or that the substances used are injurious to health, action will be taken by the Department through the proper agencies."

The law as amended neither legalizes nor prohibits the sale of bleached flour but leaves the question open upon the issue of findings as to the possible effect of bleaching on flour shipments.

Better Bread, Inc.

WHEN it comes to names, a good baker of Hartford, Conn., has surely nailed his slogan to the mast. His bakery carries the title "Better Bread, Inc." Not only does the baker do a good business, but he has become a good association member as well. His application swelled our membership rolls by two ovens!

Famous Ex-Bakers

WHEN Frank P. Walsh, famous lawyer and advocate of unpopular causes, was crusading through Ireland, or serving as Joint Chairman with Ex-president Taft on the National War Labor Board, or defending Foster, accused syndicalist, how many bakers knew that he could handle an oven peel with the best of them?

When Edward Bok, famous editor of the *Ladies' Home Journal*, was teaching millions of American women the advantages of sanitation, how many people knew that the first place Bok ever sanitized was a bakery shop window in Brooklyn?

Yet both Walsh and Bok are distinguished Americans who graduated from the bake-shop. We know that some great characters of history came from the bake-shop, such as Louis Pasteur, who discovered the modern science of sterilization by applying to surgical dressings the process he had seen going on in the baking of bread in the oven, so that its yeast content was stopped from further fermentation. We also recall from our histories that Pope Benedict XII came up from a position as baker's boy in Toulouse, France, and that he always remembered his baking days by showing great compassion for the poor.

Copernicus, we know as the world's greatest scientist until Louis Pasteur displaced him as claimant for first honors. Like Pope Benedict XII, he was a baker's son and a baker's helper in his youth in Thorn, Prussian Poland. Benjamin Franklin, while not a baker, was glad to record that the rolls of bakers' bread under his arm seemed his best friend as he made his way into Philadelphia in search of his earliest career.

With Frank P. Walsh his baking days did not include bread baking, but were confined to ginger-snaps. He became a baker's apprentice in Kansas when he was a mere boy, and spent many an hour with oven peel

in hand before the ginger-snap oven.

He outlined that phase of his early career to an employee of American Bakers Association recently on a trip through Kansas City. For more than an hour Mr. Walsh listened to the story of modern developments in the baking industry, and was astonished that it could have moved so fast in so quick a time.

Edward Bok set down in his memoirs his experience in the baking business as the foundation work of his long American career. Ed. Long of Chicago, Los Angeles, Hammond and other points, and Mr. Van De Kamp of Los Angeles, who have utilized the cleanly Dutch girl in advertising, will appreciate this narrative of the Dutch boy, Edward Bok.

This Dutch lad came to America in September, 1870. His mother was in ill health and he decided he must obtain work.

The answer as to how to obtain it, he wrote, was found one afternoon when standing before a shop window of a baker in the neighborhood of the family home in Brooklyn. The owner of the bakery, who had just placed in the window a series of trays filled with buns, tarts, and pies, came outside to look at the display. He found the hungry boy wistfully regarding the tempting wares.

"Look pretty good, don't they?" asked the baker.

"They would," answered the Dutch boy (Bok writes his memoirs in the third person), "if your windows were clean." Thus the lad expressed his National passion for cleanliness.

"That's so, too," mused the baker. "Perhaps you'll clean it."

"I will," was the laconic reply. And Edward Bok, there and then, got his first job. He went in, found a stepladder, and put so much Dutch energy into the cleaning of the large show window that the baker immediately arranged to have him clean it every Tuesday and Friday afternoon after

school. The salary was to be 50 cents per week!

But one day, after he had finished cleaning the window, and the baker was busy in the rear of the store, a customer came in, and Edward ventured to wait on her. Dexterously he wrapped up for another the fragrant currant buns for which his young soul—and stomach—so hungered! The baker watched him, saw how quickly and smilingly he served the customer, and offered Edward an extra dollar per week if he would come in afternoons and sell behind the counter. He immediately entered into the bargain with the understanding that, in addition to his salary of a dollar and a half a week, he should each afternoon carry home from the good things unsold a moderate something as a present to his mother. The baker agreed and Edward agreed to come each afternoon, except Saturday. . . .

Thus the immigrant boy, destined later to be a friend of statesmen, politicians, poets and great writers, was launched in his first American job!

Ladies—Of Old and Now

WHEN Shakespeare drew in 1600 the character of Mrs. Quigley, an associate of the "Merry Wives of Windsor," the good lady was made to enumerate her virtues thus:

"I wash, wring, bake, scour, dress meat and drink, and make the beds."

What of these activities still remain to Mrs. Quigley's modern sister?

To do her washing the great laundry industry has come together, has applied modern research and machinery, and in National magazines advertises through its National Association how sanitary are all its members' plants. The National Headquarters invites all laundry users to visit the plants where their laundering is done,

and thus drives forward for an always increasing percentage of the work once part of woman's tasks at home.

To do her baking American Bakers Association has arisen as a flowering of the baking industry. It concentrates on this industry the latest discoveries of science and drives it forward to more and more completely take over the home baker's tasks.

It is the same in meat dressing—but alas, not in drink dressing! There stands at the woman's elbow to relieve her of one of her important former tasks the great packing industry, highly specialized in its various departments, with its Meat Institute for scientific research and education.

With drink—well it has gone deeper and deeper into the recesses of the home, but father does the work furtively and with many secret rites, down cellar at the foot of the step-ladder.

The bed making remains, but not in its former grandeur. Now it is more likely to be a patent "day bed," or an in-a-door contraption that takes but little making. Thus does the new intrude upon the old as the percentage of bakers' sales climbs upward and onward every day.

Sunday Deliveries

DO YOU want the delivery of bread on Sunday stopped? It has been in Massachusetts through a court decision, and this decision has been made so sweeping that it includes hotels and restaurants. However, the baker can sell bread on Sunday in his own premises, and presumably the buyer can take it away.

From France

WE ARE interested in Baking Technology and should be very glad to receive a sample copy of the same.

—Institut Colonial De Marseille, 5 Rue Noailles-Marseille, France.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

Published by the
AMERICAN INSTITUTE OF BAKING
1135 Fullerton Ave., Chicago

Entered in the post-office at Chicago, Illinois, as second-class matter, under the act of August 24, 1912.

Price, Fifty Cents a Number; Five Dollars a Year.

MAY 15, 1923

Halved—Will It Double?

Our National Convention halved the dues for 1923. Will halving the dues double the membership, and thus stimulate the spirit of share-and-share-alike in both burdens and benefits?

Our Future Way

WHETHER are we bound with all this new co-operation looming suddenly above the bakers' horizon? For a year leaders of the American Bakers Association saw that the rift between small baker and large baker was a foolish thing when carried into Association life and activities. Suddenly came an issue of a wheat-eating campaign in which the National Retail Association and the American Bakers Association utilized a joint letterhead. Suspicion and mutual distrust had found a zone they could not enter.

In our work here at headquarters we often lamented not knowing more about our flour men. Now we have something to talk over with them. They report in, eager to promote bread sales, and full of things to talk over. Electrical men, cracker men, railroad men, automobile men and butcher men all suddenly find themselves friendly with the bakers' organization. Our allied tradesmen and our machinery men speak in a new glow of fellowship. All see more business ahead by pulling on the same set of oars.

Whither will this wave carry us? Will it lead to a permanent Wheat Institute? Perhaps that should be our new name, for at such an institute no little baker would feel it was the home of the big baker alone; no miller would feel he was "off his reservation" when he came to the institute. Cake bakers would feel the adhesion of the title, and so would pie and macaroni bakers. They could not fling back the epithet, "Oh, that is for the big bread bakers alone!" It isn't, of course. A Wheat Institute would be as broad as wheat-tillage and consumption, and the baker would loom up in the picture truly placed as one important step in the path of wheat from farm to consumer's table. He would be well tied in with all problems of patriotism, statesmanship, and national well-being that cling about the nation's wheat—our principal breadstuffs crop.

Fine Service

WHEN suits encumbered one member of the baking industry in New York, which meant court precedents for all, the New York State Association made its office a clearing house for information about the issue. It also took over the fighting of the case for the baker involved. Thus with greater prestige the matter was carried to a complete victory in the Court of Appeals. It is cases like this that prove the value of co-operation and organization to our industry.

We cannot organize with the compactness of orange growers, milk producers, raisin growers, prune growers, and apple growers, for there the central organization takes over the product, markets it as one crop, and sends each member his share minus an amount sufficient to fund the National organization.

Thus there is always abundant funds, and no wearing campaigns to

keep the vision of the National before the members' eyes. In our industry we must depend upon the good will, vision, and energy of the members of our industry for the National's support. It is the same with the state associations, and such cases help mightily all who are concerned.

Honors Well Won

IN OMAHA recently the neighbors and friends of Jay Burns gathered together in order to give him a farewell dinner on his departure from Omaha to become Chairman of the Board of Directors of the Standard Bakeries Corporation.

Jay Burns well deserved all the recognition and fellowship his associates could bestow upon him; at a critical period in the development of the baking industry he sounded the keynote for the modernization of our plants. His was a preachment in favor of sanitation, when sanitation was not yet accepted as a Modern Gospel. Perhaps no message to the baking industry was ever so bedeviled as his, and distorted to the use of unseeing propagandists. The appeal for clean bakeries was made to appear as an appeal to throttle little bakeries,—to run them down and push them out of existence, when as a matter of fact Jay Burns was pointing out to them the pathway to profits and good will.

He is our industry's best preacher at this moment, just as Henry Stude seems to be its principal man of letters, John Hartley its most human philosopher, and Theodore Van de Kamp its most active devotee of art as applied to bakery equipment.

New York Progress

IN BUILDING up the New York State Association Ralph D. Ward, as president, is setting up guide posts many other states will sooner or later follow. He and his associates have established a meeting room, for informal gatherings and conferences, have put a paid secretary in charge, and have appointed committees to watch the bakers' interests in all fields affected by state conditions. The contact of the New York State association with the National is effected through this central office in New York City. Thus the National has a local center in New York to which it can speedily apply for any local information needed, just as all states, if they would avail themselves of the privilege, have a central clearing house in the National Home to which they can apply for any National information needed.

Coming to French Lick?

TAKE it from Gordon Smith and his happy, hilarious Southerners, a baking industry that has learned how to play together will never have any trouble in doing its work together. It is hoped to catch some of the infectious good will that hangs around a Southern bakers' convention at French Lick during the week of September 9. When you decide to come there, don't overlook the Mrs., and your hunger for your favorite sport.

Afternoons are for fun—mornings for work. There is swimming, dancing, golfing, horse-back riding, field days both for men and women, tennis, and all forms of outdoor sports. The setting is in one of the most wonderfully beautiful valleys in all America.

Milk in Bread Making

It Is Found by Experiment to Possess Marked Nutritional Advantages

By C. B. MORRISON and G. W. AMIDON

Of the Research Department, American Institute of Baking

THE use of milk in bread formulas possesses inherent nutritional advantages for the production of quality bread of increased food value in comparison with white bread made without milk.

Milk as a food, considered solely on the basis of its composition and properties, is the most satisfactory single article of the diet, and when used in combination with patent flour supplements certain recognized deficiencies in the nutritive value of white bread. The nutritive value of white bread made from patent flour varies directly with the amount of milk used in the formula. This can be readily demonstrated by feeding tests on animals, in which breads containing various proportions of milk are fed as the only sources of food. While milk has been advocated as an ingredient of bread for many years, its high nutritive value has only been lately recognized. Formerly the use of milk in bread formulas was urged as an economic measure for the purpose of utilizing surplus milk on the farm, especially skimmed milk. Some of the early government bulletins stated that milk would increase the protein and fat content of bread, but more emphasis was placed on the use of milk in bread as the means of conserving a valuable food. "Its use should by all means be advocated especially on farms where milk is abundant." (1.)

Later a bulletin on "The Use of Milk as a Food" (2) first published in 1909 stated that "most persons consider that the choice between bread made with milk and bread made with water depends simply upon the taste and appearance. There is,

however, a difference in the food value."

"According to figures which were taken from analyses made at the University of Minnesota, bread made with skim milk is richer in total solids, protein and fats than otherwise similar bread made with water. The differences are not very great but are well worth considering especially where skim milk is a drug on the market."

At the time when these statements were made there was little information available on what have been termed the chemical factors in nutrition, such as the differences in the nutritive value of the proteins, the existence and relations of vitamins to deficient diets, and the problems of inorganic constituents.

In the absence of this knowledge, the earlier ideas regarding the food value of milk bread were largely confined to considerations relating to energy values, increased amounts of protein and fat, and the economy of utilizing surplus milk. During the last decade and a half, the "new knowledge of nutrition" has made it possible to explain more fully and satisfactorily why bread made with milk has more efficient nutritive properties than bread lacking this constituent.

It will be the purpose of this article to discuss the nutritive value of milk bread from the standpoint of recent conceptions in nutrition with particular reference to the results of feeding experiments which are being conducted in the Institute laboratories in which milk bread has been fed to experimental animals (Albino rats) as the sole source of food.

The following find application in bak-

ing. Fresh whole milk, fresh skimmed milk; sweetened condensed milk, sweetened condensed skimmed milk; dried milk; (powders), evaporated milk, evaporated skimmed milk, fresh buttermilk, condensed buttermilk, dried buttermilk, cream, butter fat and butter.

The Federal Food Standards for these products with the exception of condensed and dried buttermilk are found in "Standards of Purity for Food Products" U. S. Dept of Agr. Circular 136, Office of the Secretary. Since the publication of this bulletin the definitions of evaporated milk and butter have been revised.

Composition of Milk

Fresh whole milk varies in composition according to various conditions such as the breed of the cow, season of the year, character of the feed, care, time and completeness of milking. The Federal Standard for milk does not include or fix limits of composition because it has "seemed impracticable to fix minimum limits that will apply to all sections, and the state and municipal standards have been deemed sufficient. These are by no means uniform. The minimum limits for total solids range from 11 to 13% and for fat from 2.5 to 3.7%" (3). Bakers who buy fresh whole milk should be guided by their state and municipal standards.

Many thousands of analyses have been made of cow's milk for the purpose of establishing its normal composition, especially in relation to adulteration, such as watering and skimming. The average composition of milk is—Water, 87%; Protein, 3.3%; Fat, 4%; Milk sugar, 5%; and mineral matter or ash 0.7%. The specific gravity ranges from 1.029 to 1.034 at 60° F. The specific gravity stands in relation to the amount of water and other constituents. A milk with a high fat content will have a lower specific gravity if the other constitu-

ents are not increased proportionally. The specific gravity of skimmed milk is higher than whole milk, while that of cream because of its high fat content is lower. There is a fairly definite relationship between the specific gravity of the milk, the amount of fat and the plasma solids, so that when two of these factors are known the third can be calculated. This has a constant application in practical milk inspection, where it is customary to first determine the specific gravity of the milk by the lactometer; the fat by the rapid Babcock Method and the total solids by calculation from the two observed factors, specific gravity and fat. Methods for the detection of the adulteration of milk will be found in the standard textbooks on food inspection and analysis. Leach (4), Woodman (5), Konig (6), Allen (7) and others.

Milk Proteins

The proteins have long occupied a conspicuous position in nutrition. They were early recognized as constituents of the tissues and indispensable for their construction, maintenance and repair. Until comparative recent years, there was little known about the chemistry of the proteins and nutritive differences which have lately been shown to exist among them.

Proteins were formerly considered largely from the standpoint of such questions as the quantity necessary for normal nutrition and in connection with certain energy relations.

Lately the conception of the *quality* of the protein has become of great fundamental importance in nutrition and recent work is more concerned with this factor than that of quantity. This has been due to the work of Kossel, Fischer and Osborne in revealing the structure of the complex protein molecule and by the notable experiments of Osborne and Mendel on the feeding of pure proteins to animals. The vari-

ous lines of protein research developed during the last twenty-five years has been summarized by McCollum (8).

The present position in nutrition is "that the nutritive value of the proteins is determined by their yields of eighteen or more amino acids which are formed on digestion. The more nearly these proportions correspond to the content of amino-acids in the tissues of the growing animal, the more effectively can food proteins be changed into body proteins. There are surprising differences in the biological values of the proteins in certain of our important foods."

The proteins of milk are of high nutritive value. The total proteins of normal milk varies somewhat but is usually present to the extent of 3.3%. There are several proteins which are found in milk but the most important are casein and lactalbumin. A third protein lactoglobulin is also present and probably another in extremely small amounts. Osborne & Wakeman (9).

Casein or caseinogen forms about 80% of the proteins of milk and is one of the most easily digested proteins known. It contains a relatively high percentage of phosphorus. Casein probably exists in milk as a neutral calcium caseinate. (Van Slyke and Bosworth (10)).

Many feeding experiments by Osborn and Mendel, and other investigators have demonstrated that casein will meet the nitrogen requirements of an animal when introduced into the diet as the sole source of protein. Casein is a "complete" protein in respect to its amino-acids, although the simplest one, glycocoll is absent from its molecule. There is sufficient evidence, however, that glycocoll can be built up in the tissues of the higher animals.

Lactalbumin the second important protein of cow's milk has been the subject of intensive investigation by (Osborne and Mendel, McCollum, Simmonds and Parsons,

and Emmet and Luros). The earlier work of Osborne and Mendel tended to show that lactalbumin was more efficient in promoting growth than equivalent amounts of casein. This view has been revised by later work and it is now generally accepted that lactalbumin is an "incomplete" protein and cannot replace casein.

Lactoglobulin has not been studied to the extent of casein and lactalbumin, and comparatively little is known about its specific nutritive effects. Osborne and Wakeman (11).

The proteins of milk have exceptionally high biological value in comparison with other proteins especially in relation to the healthy growth of young animals, as has been well established by the experience of many investigators. The value of the milk proteins in supplementing the proteins of the cereal grains is also well established and will be discussed later in this connection.

(To Be Continued.)

Bakers—Small vs. Big

HOW DOES it come that some communities are served by one big baking plant, almost alone, while other still smaller communities are served by scores of little plants, each serving a "walk to the bakery" trade?

How does it come that the little bakers sometimes fear big competitors and will have nothing to do with a National association or even with a state association. We have just seen a situation of that kind in which premiums given by the larger bakers have destroyed all fellowship on the part of the smaller men.

On the other hand we know a baker who was the smallest in his home town. He JOINED THE NATIONAL just so he could learn how the big bakers displaced little bakers in some communities. He

learned they did it by sanitary plants that women were made welcome at as visitors. He made his plant the most sanitary in town and invited his customers to go through it. He learned that the quality loaf meant more sales. He studied quality AT OUR AMERICAN INSTITUTE.

There he found all the information open and available—to the smallest baker of intelligent curiosity along with the largest. He made the best loaf in his town.

Presently came conversations at National conventions about new machinery. He ordered every new machine he could afford—he trusted the new inventions. Now he sells the WHOLE COMMUNITY the bulk of their bread and besides sells half of the community their ice cream.

When a big baker came to look his town over he found he had no bag of tricks to pull, such as had worked so well elsewhere. And he passed that community by. Thus thrives David Ackerman out in Spokane.

Now comes the Retail Baker of Brooklyn, telling the retail bakers of its New York constituency something very like the truth as we have observed it.

"Advertising will *not* sell bread," says this paper's observing editor, "unless the QUALITY is good. Unlike buying a house once in a life-time or a tin lizzy expected to last a few weeks at least, the Staff of Life is bought by many a housewife several times daily. Hot out of the oven, fresh and crispy the neighborhood baker sells it. If, however, the morning batch is a failure, it certainly will not advertise the afternoon output.

"Don't let us complain about something we should consider a benefit. I ask you, is there any ingredient, is there any advertised loaf, which is not available to the small baker? Is it not within your means to buy all the modern machinery necessary in an up-to-date plant? Are you not good mechanics and certainly there is no patent

process of baking or secret ingredient, contrary statements notwithstanding."

The American Institute of Baking certainly knows there are no secret ingredients. The pathfinders of the baking industry certainly have tried to make the quality loaf the only one that any American is asked to eat. They have seen the enormous advantages that accrued to the orange growers, the apple growers, the milk producers, the raisin producers, by permitting only quality goods to reach the market. The FREE SCORING SERVICE has built up many a loaf for American bakers, big and little alike.

Allied Helpers

JOHN BURNS, president of the Allied Trades of the Baking Industry, told the southern bakers at Atlanta that he felt the allied trades were a "sort of caboose attached to the bakers' train." As a matter of fact they are the apostles, teachers, and go-getters of the New Day. They mix eternally and so know the bakers' language, not in one section but in every section.

Their suggestions have done more than suggestion from bakers themselves to help the American Institute shape its course to meet maximum of bakers' needs.

"Send us fifty application blanks" writes H. H. Jones, of the Kalamazoo Vegetable Parchment Co., in a typical letter from an allied tradesman, "and we will leave them with fifty bakers after telling the advantages of your association as best we can. We are always anxious to promote association among bakers." That is the spirit of the hour among the allies. To John Burns himself we are indebted for the original suggestion that has now flowered into the "Toast for Breakfast" movement. It promises to be one of the really great thrusts to "put the eat back into wheat" after the war's work in taking it out.

Mold the Bakers' Enemy

It Attacks Bread Wherever Air Borne Spores Find Moisture and Warmth

1. MOLDS cause a loss every year of many thousands of dollars to the bakers of the United States.

2. In order to prevent this loss it is important that the baker should know what molds are, the source of mold infection and the cure.

3. Mold is a disease of bread just the same as cancer is a disease of the human body and rot is a disease of fruit. The first principle of all disease prevention is to know the nature of the disease and then find the cure.

A mold is a living plant that grows on bread, not so large a plant as a fern or a lilac bush but a plant nevertheless. If you will notice closely the cottony like material (the mold on bread) you will see that it consists of a mass of very thin threads matted together. Stalks arise from these threads and on those stalks the spores are borne.

There are three types of mold most common to bread—*Penicillium*, the common blue mold of bread; *Aspergillus*, a mold that is usually green or brownish black, depending upon the species, and *Rhizopus nigricans*, a greyish to brown mold, that produces such a felt-like growth over its host that the fruit men call it "whiskers."

The three types of molds have their own peculiar method of producing spores. The spores of the mold *Rhizopus nigricans* (whiskers) are produced in tiny spore balls called sporangia. These sporangia are borne on slender stalks that arise from the cottony-like material. There are approximately 500 spores to every tiny spore case. The spore cases are so fragile that the slightest disturbance by handling or a puff of air will release these spores like seeds from a pod. A drawing of the mold *Rhizopus nigricans* is given on the next page.

On a loaf of bread that is moldy there are millions of spores produced.

A spore serves the same purpose to a mold that a seed does to any other plant, namely, reproduction. Mold spores average about one ten-thousandth of an inch in diameter so you can readily see how easy it is for a spore to be carried on dust particles or through the air ready to infect a loaf of bread if conditions are favorable. The conditions favorable for the germination and development of mold spores are as follows: moisture, proper temperature, sugar and preferably acidity and oxygen.

When bread leaves the oven it is sterile as far as molds are concerned for even the center of the loaf in the last ten minutes of baking reaches a temperature of 206° F. to 208° F., a temperature sufficient to kill mold spores.

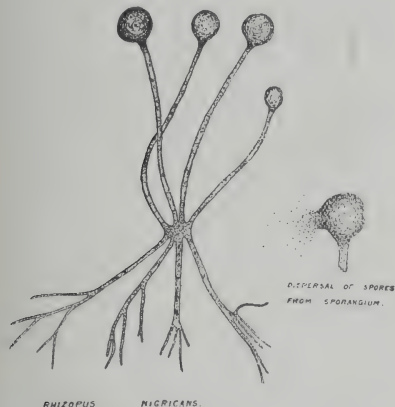
Mold infection takes place after the bread leaves the oven and is due to air, handling, racks, wrapping machinery and wrapping paper. Mold spores are always present in the air. Dusting flour that is flying in the air is quite a common source of mold infection.

In the prevention of mold infection it is out of the question to use antiseptics in the bread so it is important to carry out the following procedures in order to prevent infection:

Bread that is wrapped too warm will "sweat" and as stated before mold spores require plenty of moisture in order to germinate and develop. Bread should be cooled from one to two hours, depending upon the temperature of the wrapping room and whether it is summer or winter.

Another most important factor in the prevention of mold infection is that of sanitary conditions in the shop. Mold infection

decreases as sanitary conditions in the shop are improved. The sanitary precautions include scrubbing of floors, the cleansing of racks and machinery, the washing of walls and ceilings at intervals, with antiseptic solutions, the wrapping of bread in a clean sanitary room where there is cool air and plenty of sunlight. It is important that the air be as free of dusting flour as possible.



HOW SPORES INFECT A BAKERY. EACH OPENING POD DISPERSES FROM 500 TO 1,000 SPORES.

Also, the employes should refrain from stirring up any unnecessary dust in the air.

If the above precautions are carried out I am sure that you will notice a decrease in mold infections.

H. E. TURLEY.

A Newer Horizon

UNTIL I came to the Baking School of the American Institute I just "worked at my job" in the plant of Cushman & Sons, Inc., New York. I never knew why I did any particular thing in any special way. I was just "holding a job." Now I can never look on my work in that light again. I am leaving the school proud of the industry

for which I work and glad to be a part of it.

I never knew there was such a thing as scoring bread when I came to the school course, nor that one loaf differed from another particularly. Now I know loaves do differ and I know why, and how the best of loaves is built up through the elimination of defects. I am not going back to the plant to burn up things, but I am going back to carry in my work a love and respect for a good loaf of bread and a hope that I am to have a chance to make loaves as good as they can be made.

—Frank McDonough, on graduating from the American Institute's School of Baking, March 20, 1923.

A Memoir to Publish

I HAVE your letter asking me to write my memoirs as a former president of American Bakers Association. I will do as you request. The story is one of three score years and ten in the baking industry. I have seen the trade grow until it is now a profession, and the despised baker is taking his place with the highest in the land. The old days of drudgery are gone and machinery and chemistry have come. O, what changes!

Bakers in unsanitary shops, wearing old cast-off clothing, barefooted and unkempt, have now given place to model bakeries with workers in neat, white uniforms.

It is a privilege to look back on all this after many years and to feel that I have had a share in it.

"Oh the old days, and the old ways,
And the world as it used to be."

I am glad to have had the privilege of meeting Dr. Barnard, director of the new American Institute, and of associating with him.

—From a letter of Robert Morton, retired baker of Los Angeles, and president in 1901-2 of American Bakers' Association.

Warm Weather and Rope

*How Change in Acidity of Dough Batch Insures Baker
Against This Summer Pest*

THE disease of bread known as rope is a warm weather disease. A number of loaves of ropy bread have already come to the attention of the Service Laboratory.

This disease is caused by a bacterium belonging to the group of bacteria known as *Bacillus mesentericus*. The rope bacteria are distributed everywhere in nature and are present in the soil, water, on cereal grains and are nearly always present on potatoes. These bacteria are found in great abundance on the bran coatings and in the crease of the kernel. Hence, a low grade flour is more apt to be heavily infected than a patent flour. It seems to be the consensus of opinion that flour is a greater source of rope bacteria than other baking materials.

Under proper temperature and moisture conditions and in a neutral to alkaline dough rope will develop within 24 hours. The first sign of rope is noticed by an odor of over-ripe melons. Later the crumb becomes darker in color and the affected part will change from a normal crumb to a sticky mass that can be drawn out in threads, hence the name rope. Caution—After handling ropy bread do not handle dough or any utensils until the hands are washed in vinegar water.

The baking temperature is not sufficient to kill the spores of the rope organism. After the bread leaves the oven the spores will germinate and develop under the conditions given above.

Prevention of Rope

Rope will not develop under acid conditions of growth. Therefore, by using acids in the dough rope can absolutely be eliminated. The most common acid used is

acetic, the acid contained in vinegar. If rope appears you should use 3 pints of commercial vinegar (4% or 40 grain) to every 100 pounds of flour. Then select several loaves from the day's bake and place them in a very warm (about 90° F.) moist place. Cut and examine one or two loaves at the end of 12 hours, 24 hours and 48 hours. If no rope has developed decrease the quantity of vinegar to a pint and a half and test for rope as above. Decrease the quantity of acid used but allow a safe margin in order to insure freedom from rope.

In addition to the above precautions the following shop practices will tend to prevent the appearance of rope:

1. Allow the dough more age.
2. A change from straight doughs to sponge doughs will help.
3. Using 2 to 2½% buttermilk on total flour used, or a pint of 4% vinegar to 100 pounds flour.
4. Use as little steam as possible.
5. Bake bread thoroughly.
6. Allow the bread to cool thoroughly before wrapping in a clean, light room.
7. Store flour in a dry place.
8. Clean and fumigate proof boxes once a week.
9. Wash utensils, troughs and mixers with hot vinegar solution. This applies to an infected plant.
10. Avoid bringing in ropy bread through the medium of returned stales.

NOTE—If using any buttermilk or vinegar be careful to watch the fermentation. The increased acidity in the dough causes the dough to mature much faster and therefore must be taken sooner.

H. E. TURLEY and WM. WALMSLEY.

Bread—with Butter

EVERY time statistics are published showing the consumption of bread per capita in various nations, England runs well ahead of America. And it is no wonder. In England they have the function of 4 o'clock tea.

With the tea invariably goes toast. It isn't just plain toast, either. Usually it is cinnamon toast. The bread habit is even carried over to dinner time, for often the English dinner consists of five or six varieties of bread and toast served with bacon.

The Fairmount Creamery Company of Omaha, Nebraska, sees great possibilities in toast of all kinds if introduced in America on something like the English scale of use. And this creamery company has decided to do its share. It has published a beautifully printed little booklet styled "Hints for Housewives."

This little booklet is mostly about milk and butter. But it has a page about "Toast, the Great American Breakfast Food." It tells how to add flavor and attractiveness to toast with a teaspoonful of cinnamon and a cup of powdered sugar. It suggests even that white raisin bread makes the best kind of cinnamon toast. It tells also of cheese toast, of French toast, of California toast, made from bread, prunes, orange juice, and prune juice, with whipped cream.

Here is a sample of what an industry that is really organized can do. To bakers it means just one thing: the milk and dairy industry is better organized than ours is. It does more; drives more campaigns through to the end—as ours will do when the bakers really rally to the National support.

Going to Australia?

"OUR annual conference for Australia and New Zealand will be held in October

next at Melbourne," writes Secretary Dempsey of the Master Bakers' Association of Queensland. "If any American bakers," he adds, "are contemplating a visit to Australia we will be delighted to welcome them when they will have an opportunity of seeing something of our country and more particularly of our trade under the most favorable auspices. Your very valuable journal, 'Baking Technology,' reaches us regularly."

STATEMENT OF THE OWNERSHIP

Of BAKING TECHNOLOGY, published monthly at Chicago, Ill., for April 1, 1923.

State of Illinois, County of Cook, ss.

Before me, a notary public, in and for the State and county aforesaid, personally appeared I. K. Russell, who, having been duly sworn according to law, deposes and says that he is the Editor of the BAKING TECHNOLOGY and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—The American Institute of Baking.

Editor—I. K. Russell.

Managing Editor—None.

Business Managers—None.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders, owning or holding 1 per cent or more of the total amount of stock.) The American Institute of Baking, a Corporation not organized for profit; H. E. Barnard, Sec'y and Business Manager; Charles A. Paesch, Treasurer; William H. Korn, Chairman; J. M. Livingston, First Vice Chairman; Paul J. Stern, Second Vice Chairman.

3. That the known bondholders, mortgages and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than a bona fide owner; and this affiant has no reason to believe that any other persons, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

I. K. RUSSELL,

Editor.

Sworn to and subscribed before me this 30th day of March, 1923.

ROSABELLE E. PRIDDAT.

(My commission expires Aug. 24, 1926.)

(Seal.)

Bakers as Co-operators

How They Can Work With Other Industries In Advertising

By H. E. BARNARD

Director American Institute of Baking

THE psychology of advertising is a most practical branch of an important science and I approach it with full knowledge that I am an amateur whose ability to bring to you anything new, original or of value will depend entirely upon my success in finding some Rosetta Stone which may give me the key to the translation of your science into my own tongue.

A month ago I thought the key was "BREAD AND," and I would then have stressed bread as the logical peg on which to hang my subject. I would have developed the idea that bread could be made the carrier for milk advertising, butter arguments, jam appeal. But today it seems unnecessary to discuss this idea for already it is blazoned on billboards from coast to coast and millions of minds are impressed through picture and printed word by the fact that milk and butter and jam all help to make bread better. And the flour miller who wants to sell flour is now talking to his potential customers in terms of products of flour and the products of other industries which help to make flour interesting to the great family which gathers three times a day around the American table.

Advertising which stops talking brand and paints a picture of pleasant and profitable utilization of that brand, which is not content to sell butter by plastering a crude picture of a stupid pasteboard carton presumably containing some special butter on expensive billboards, which carries a direct appeal to eat ham or cheese or salad dressing in the form of attractive sandwiches, which urges the use of milk by pointing out

its nutritive values instead of by picturing glass bottles, is, as I see it, the best form of advertising. That is what I would have talked about a month ago; today I have a new and broader subject which touches directly or indirectly every industry merged in this Association. That subject is "Eat More Wheat" the slogan of permanent prosperity, the virile phrase which may be translated into a national era of good times which will not again be checked by agricultural bankruptcy.

"Eat More Wheat" is the antithesis of the wartime admonition to "Save Wheat and Win the War." We all saved wheat; no doubt by so doing we did a great deal toward winning the war. I well recall being in a council of officials of the United States Food Administration at Washington in February, 1918, when Mr. Hoover read to us a cablegram he had just received from Lord Rhondda, the Food Administrator of England, which said in effect "we have lost the war, we cannot longer continue to fight; we do not have the food with which to maintain our armies or our civilian population." And Mr. Hoover cabled in reply the promise of the American people to provide munitions of war in terms of wheat, of pork, of sugar.

In those stern days we changed the eating habits of a hundred million people and we made good our pledge to save food. Today in the midst of apparent prosperity, with every industry save agriculture busy, with no unemployment, with ample and easy money, with Congress adjourned for months, we know, if we dare confess it, that the good business of today is based on

*In an address before the Association of National Advertisers at Detroit, Mich.

optimism and hope when it should rest on the sound foundation of agricultural prosperity.

Cities and Country

What are our cities but trading posts for the back country? What is Detroit but a machine shop turning out Fords for farmers and trucks for middlemen who haul the products of agriculture to the kitchen door? What is Chicago but a merchandise exchange; 85% of all mail order business is farm business; 98% of all implement business is farm business; 100% of all packing business is farm business. Our banks live by handling farm paper or the industries directly dependent upon the farmer. Our railroads would be streaks of rust almost over night if they hauled no products of the farm; our political parties would be bankrupt if they had no interest in the farmer and his vote.

There are 2,000,000 wheat farmers in our country and they are raising our most essential food at a loss. Every bushel of wheat grown in 1922 took to market farm labor, soil fertility, heavy taxes and in addition a part of the farmer's capital. He was poorer after he had sold his crop than he was before he sowed it. His ability to purchase was less; his resentment against an economic situation which apparently was bringing prosperity to everyone except himself was intensified.

The average surplus wheat crop is 170,000,000 bushels. This wheat has been sold in the markets of the world. Most of it went to England and Continental Europe usually sacked as flour. Today the world is changed. China, Japan, England, all the countries which bought flour now buy wheat and grind it in their own mills. Europe lacks the credit with which to buy American wheat and her weary people are turning to other food sources. Any wheat which does seek a foreign market has to meet the

price of wheat grown by cheap labor on the cheap lands of Australia, India, Egypt and this coming season Russia, Bessarabia and the great areas of southeastern Europe.

Helping The Farmer

How can our wheat farmers be helped? Not by government price fixing, not by new political alignments, not by public loans but by receptive and remunerative markets. The market is right at hand, it may be found in every American home, it is opened up by the simple slogan "Eat More Wheat"; 170,000,000 bushels of wheat is 35,000,000 barrels of flour or but a single slice of bread added to the meal. Can we add that slice of bread to a diet already ample? Is there anywhere the psychological appeal which will put the "eat" back into wheat as effectively as we took it out five years ago? We believe there is. It lies in the fact that we must relieve the farmer if we are to avoid economic disaster. The shoemaker in Brockton, the cotton spinner in the south, the printer in Chicago, every laborer, every artisan, every professional man, whether he realizes it or not, is directly concerned in taking care of that 35,000,000 barrels of flour.

And here is the opportunity for co-operative advertising—the kind of joint effort which sold Liberty Bonds and which made the United States Food Administration a mighty power in war. "Eat More Wheat" means to the cotton grower and spinner an additional market for 40,000,000 yards of cotton cloth; it means a market for 162,500,000 bushels of corn required to fatten 4,375,000 hogs weighing 200 pounds each to furnish the one hundred forty million pounds of lard needed as shortening for the flour ground from our surplus wheat. It means billions of pounds of milk for enriching the dough made from 35,000,000 barrels of flour. It means a billion pounds of butter to spread the bread. It means

a need for 140,000,000 pounds of yeast made from millions of bushels of rye and barley; an equal amount of sugar to sweeten the bread, uncounted quantities of raisins for raisin bread, sweet goods and pies, great volumes of sauces to be eaten with macaroni and spaghetti, huge quantities of meat which with bread and butter fill every American dinner pail.

Prosperity For Railroads

It means prosperity for the railroads which haul the wheat from the farm and an infinite variety of goods back to it; for implement manufacturers who are waiting to sell tools, for clothiers, shoemakers, manufacturers and merchants of any commodity which helps to make farm life comfortable and happy. It means contentment in this country, less unrest, less longing for changes, less hunting for economic panaceas, less legislative "tinkering." Is there anywhere any better formula for sound government than that expressed in the simple phrase—"Eat More Wheat"? Call it what you will—admonition, command, request—can you find a better economic urge to permanent agricultural prosperity than "Eat More Wheat"?

The strength of the movement is, of course, its vital necessity but to this appeal is added that of its unselfishness, its avoidance of any element of personal gain and as well the opportunity which opens up for the merging of important industries in a common movement for national prosperity.

For a hundred years, farmers, millers and bakers have been feeding an ever increasing population with its most essential food. And in all those years there has never been a common ground on which these four interested parties, the farmer who grows the wheat, the miller who grinds it, the baker who bakes the flour and the consumer who eats it, could meet. The effort to increase the American bread ration

can be successful only as it arouses public consciousness to its duty and opportunity. And the campaign which is now starting will fail utterly unless from the very outset every note of self interest, every attempt to limit its operation, every suggestion of industrial propaganda is avoided and forgotten.

The Nation's Outlook

The farmer thinks of his problems in terms of wheat. The nation considers it, in its economic aspect, in terms of wheat. The creation of a public consciousness which understands the national need for the increased use of the products of wheat depends on a volume and breadth of publicity which is bounded by no individual industry, no private brands, no personal gain.

The introduction of a single note by one group which antagonizes another or which produces discord or doubt will destroy the unity of thought and effort which is so essential to success.

The farmer can say EAT MORE WHEAT and do it himself. He can bring to play the political forces and educational forces which are concerned with his prosperity and advancement.

The miller can say EAT MORE WHEAT and pave the way through his publicity to the greater use of every product into which wheat enters. He cannot and must not tie himself to the use of any term that helps some specific product or to the use of any term which antagonizes any class of trade. To do this will create a division in the ranks from which much of this effort and direction must arise.

The baker can say EAT MORE WHEAT—DO IT WITH BREAD, or he may find an opportunity to put an extra slice of toast on the breakfast table through the intensive campaign which he is now developing with the aid of electric toaster manufacturers, power companies and butter makers. He

cannot permanently increase the sale of his product by any selfish methods of advertising. His ultimate benefit is bound to come with the success of the campaign.

New Methods of Advertising

The same is true with the bakers of sweet goods, pies, biscuits, crackers, and macaroni. We can say WHEAT PRODUCTS ARE THE BEST AND CHEAPEST FOOD, but when we apply it to bread alone we have circumscribed the whole movement in a way that ties it down to one form of manufacturing.

Is this method of advertising flour, bread, crackers, macaroni, breakfast foods, every product of wheat, in terms of wheat itself, unsound or is it the best form of advertising psychology? Is such a plan of cooperative advertising worth more than the casual study of every man whose business is a link in the long chain which binds our prosperity, as a nation, so closely to the prosperity of the Dakota wheat farmer? Cannot the man who sells anything, be it shoes or sealing wax, find in this "Eat More Wheat" campaign his opportunity to help arouse in 100,000,000 people the desire to eat another slice of bread.

Our House

A PICTURE of the American Institute of Baking, hung in a baker's office is much more than a pleasing view of good architecture. It is a symbol of a newly united industry, bent on bringing to its service all that science can find out about the world we live in, as applied to baking problems. It is a symbol, also, of an industry united to educate itself and a new generation of bakers to attack modern problems in the most modern manner possible.

J. F. Gemming received a picture of "our house" and from his bakery where "plain and fancy baking" is done at

Blandinsville, Ill., he appraises modern baking opportunities in these words:

"I have received the picture of 'Our House' and it is waiting now at the village picture framers to be dressed up. To say I am interested in 'Our House' and what it represents is putting it mildly. I think 'fanatic' would express my view better. Play the game. Get in the collar. If a thing is not worth ALL YOURSELF it is hardly worth anything at all and that applies to digging ditches, making love, and baking as well. I am a baker, not the best, but I hope not the worst. I am proud of my trade, or should I say profession. I am more than proud to have my name among those that can and will do great things for the industry. Looking back for nearly thirty years when I dried wood on pans in the oven for the night's baking, when I nearly broke my back over five, ten and twelve pails of dough mixed per night by hand,—when I review those years and see the wonderful strides of the last few, owing to the men like those that comprise the Institute I can see no place for trade secrets, no place for selfishness, no place for competition except in a friendly way. What is good for one of us is good for all of us and the industry at large. Our real competitor is the housewife. If you were here in my little business you would soon see it. I am only a little candle among the arc-lights but I am trying to shine for the good of the cause, and my fellow bakers."

Our Service

I CERTAINLY am thankful for the suggestions and help I have received from your service department since joining you.

Words fail to express the credit due you men in the service you are rendering our industry.

J. F. GEMMING,
Blandinsville, Ill.

The Far West Organizes

Impetus of Conferences Arranged by Leaders Rolls on to Formation of Strong Local Associations

IF ONE should make a survey of the baking industry, socially and economically from the standpoint of organization, he would probably vote that the Southern bakers are the best organized socially—that is that they have learned best how to play and sing together and to make their conventions centers of unstinted merriment and enjoyment.

Perhaps the native “southern hospitality”—a growth peculiar to the South and distinctive of it, has unconsciously helped them here.

In the matter of understanding bakers’ problems, and holding rapid-fire business meetings New England and New York would probably take first place, with Pennsylvania coming a close second.

The middle west, unfortunately, is more seamed with dissention and doubts and is too filled with too many foolish rumors that lead to feuds and doubts of one another’s good intentions.

And when it comes to the Far West then we find that as the miles are great and cities far apart, it is hard for bakers to get together. They are just finding the way to one another’s hearts, and to common meeting rooms.

This is a story of the remarkable progress they are making in getting together.

Denver Gets Together

First of the new spring organization meetings occurred in Denver, where the Colorado State Bakers Association was organized. A month before this meeting an officer of the American Bakers Association visited many of those who attended. Most of the folks visited showed their minds were not yet ready for an organization. They feared their competitors, they hated

some so much they did not want to meet with them. They had complaints about premiums, rebates, and all manner of unessential “trade practices.”

But there arose among them I. T. Ettenson of the Kilpatrick Baking Co., of Santa Fe Drive and Eighth Street, Denver. He called a meeting at which seventy-five bakers responded. That is as good a showing as most any state could make. Texas turned out about that number of bakers. So did the Southern convention, at Atlanta. Kansas and Oklahoma did no better combined. New York State, with its vast centering of population was upon about the same numerical strength at its last meeting.

The seventy-five bakers celebrated the finding of a live and adhesive centering for their efforts in the person of Mr. Ettenson by electing him president. For the rest of the officers they elected P. C. Johnson, of Boulder, vice-president; R. Ferril of Colorado Springs, second vice-president; J. A. Ferguson, of Denver, third vice-president, James Holmes, of Denver, secretary, and Roger D. Knight, of Denver, treasurer.

A quick-fire membership campaign brought 150 bakers into the Colorado organization. This amounted to 30 per cent of the total number of bakers in the state. What state can boast a higher percentage?

Mr. C. O. Zimmerman of Colorado Springs and Mr. Ettenson together sent in a really substantial number of memberships for the National, thus linking the young state organization up with the National at the very outset, in a splendid manner.

In several of these western states they have tried an experiment that may appeal to the National association itself later. They have organized in divisions, each with a special chairman. Thus there is the retail division, the allied trades division, the wholesale division, and later there may be the pie division, the cake division, the macaroni division, the flour division and the machinery division.

Out in Washington

Out in Washington State an older state organization has been redevise and reshaped to modern conditions.

Charles H. Heighton, the new secretary, announced the rebirth of a state organization in a letter to National headquarters, reading: "This is the first letter to be sent out by the new Washington State Master Bakers Association. We hope to make it one of the best of its kind. We hope to overcome any feeling on the part of retailers that their interests are antagonistic to the wholesalers.

"The Association is a vigorous child. It has opened offices in the Seaboard Bldg., 4th Avenue and Pike Street, Seattle, and already the bakers of Seattle and Tacoma have come to this office to discuss their problems. Splendid results have followed.

"Think of it—Washington is the only state of its size which has not had a strong state association. AS A RESULT there has been unfair competition, costly both to the industry and the public,—ill feeling among some members of the trade,—and failures and near failures.

"Through the association we hope to create a feeling of fraternity and good-fellowship, to put the industry on a business basis, and to cooperate to the fullest extent for the mutual benefit of everyone concerned."

The final appeal of Secretary Heighton to the Washington bakers was "to forget the dead past, and take advantage of the

opportunity to cooperate, to learn to know one another, to put the baking industry on a higher plane."

In Oregon

In Oregon the bakers had recently witnessed a disastrous fire which had wiped out the town of Astoria, down the Columbia a night's sail from Portland. They had seen the Haynes-Foster Baking Co. jump into the breach in a dramatic manner, Mr. Haynes forgetting his business to open and operate a free soup kitchen for a week. They had seen the Haynes-Foster Co., through the personal efforts of Mr. Foster, set up the first new building in Astoria, before the ashes of the town were fairly cold. Into this they had seen baked goods unloaded daily from Portland, so that the homeless townfolk never suffered for a moment for lack of fresh sweetgoods or bread. Then they had seen a new bakery arise with the new town itself, and Mr. Foster remained active in every way in bringing the new community into existence.

From this task he turned to the work of organizing the Portland bakers. They are now coming together under the slogan "that we bakers must establish confidence in ourselves before we can establish confidence in our products." The bakers have closely affiliated with the Chamber of Commerce and other public associations.

California Situation

California is so big both ways that Southern California hardly is within hailing distance of San Francisco, Sacramento and environs. In Southern California they run a close second to our Southern States in social organization and the development of the play spirit as well as the development of business routine. In the San Joaquin valley the valley bakers have just organized, and promise to become one of three strong units within the state, and as soon as they organize they asked

for associate membership in the National. Frank A. Kent, secretary of the Valley Association has even gone to the extent of starting a magazine called "The Dough Mixer," which gives this new association a voice as well as leadership.

In San Francisco R. J. Workman has taken hold, with the slogan, "I had rather fight my competitor with time than money." He means by that that he had rather make his competitor his friend and get an understanding with him, through organization of their mutual power to serve the community rather than to waste their joint strength in animosities.

Local bakers clubs supplement the larger associations in all sections of the Great West. Thus this part of the country, together with Utah and Idaho, shape their course up into the field of the greatest potential National service.

Non-Cooking Womanhood

WHEN next the editor of your local paper starts a drive against bakers to see if he can "stampede the housewife back to kitchen baking," just hand him this little article. It is written for such editors when they need it most.

The story it tells is that of the Y. M. C. A., and a school of baking it tried to "put over." At the same time it tried to put over a School of Beauty Culture, and now listen to Alice Reddington Wright, secretary of the West Side Branch Y. W. C. A., in New York. She tells her story in the New York World's Sunday Magazine and here is a condensation of its salient features:

"The Y. W. C. A. has dropped its classes in cooking. It is substituting classes in beauty culture. This state of affairs may come to you as a shock or as a surprise depending on your temperament, but you can be no more amazed at it than we were

at the necessity of such action.

"We inaugurated a course of lectures . . . but no matter how we dressed the cooking class, and no matter what we called it there were *no enrollments*. Older women sought it not at all. Our usual hope, *THE BRIDES*, ignored it.

"The Y. W. C. A. enrolls throughout the United States in 1,152 centers 605,880 girls. In most of these centers the Y. W. C. A. has always taught domestic science. Now in all of the larger cities and most of the small ones the association is discovering that these classes are dead,—dead from lack of registration and attendance,—*DEAD WITHOUT A SIGH FOR THEIR PASSING.*"

That is a real note as to the arrival of a new, modern mood among women. So much for the home-cooking and baking stuff. Now turn to Beauty Culture:

"The West Side Branch," continues Miss Wright, "has turned the space assigned to domestic science over to a beauty shop. We instruct in manicuring, the scientific care of hair and skin, marcel waving, facial massage and all the little aids that hairdressers have invented since the time women first discovered her mirror.

"Cleanliness and a neat personal appearance are the business woman's great asset. Also, being at business, she has so little time for rest that unless she knows scientifically how to care for her skin and scalp her looks suffer, and often that means her earning capacity is lessened. Age always has been woman's greatest foe but it is even more so now that she is competing with man in the business world. Beauty culture puts it, temporarily at least, to rest.

"For these women members then, we are putting in beauty classes and for the men we are establishing cafeterias. Upon investigation we find that most of our din-

ers are married couples—the wife a member, and the husband brought to his meal by his uncooking but energetic partner.

“Much more than the vote ever was this DECLINING TO COOK is the emblem of the modern woman’s emancipation. She is completely superior to the old, much advertised route to a man’s heart. Apparently the husband of the next generation will never be able to taunt his bride with the flakiness of mother’s pies. The best he will be able to muster will be tender recollections of lovely cafeterias the old dear used to recommend.

“The girl of this generation, and the generation coming, is working and living for herself. She is very much in earnest. They are simply doing what men have been doing for years, and are thus overcoming what has been held by men as the chief failure of women to reach the higher earning capacities. It was the feminine reaction when outlay was exceeding income to retrench. Formerly the girl who wasn’t earning quite enough stayed in and did her own laundry and waved her locks on hideous, tight little curlers. Today she sees that the way to meet expenses is to get more income. Her ambition is more focused, more crystallized. Marriage is no impediment to it. She puts both her home and her husband on a business basis and seems to run both of them quite efficiently. And she keeps on with her own job. In the meantime the Y. W. C. A. will continue to serve meals by means of cafeterias. We have great faith in the new American girl. Perhaps she is putting aside her domesticity, but she is surely becoming a very companionable, well-groomed wife, and possibly that is much superior to the old order of things.”

Is it? Opinions will differ,—but one thing is certain. The foolish man who tries to stampede the modern girl against the product of the modern baker has a bigger job than he can ever swing.

Our Baking Industry in Scientific Magazines

A YEAR ago a few far-seeing bakers insisted there was material in the baking industry that was worthy of the notice of the best of our scientists. They appealed to the headquarters staff to see if this staff could not obtain space and consideration from the scientific press.

Consider, now, what one short year of effort has accomplished. The magazine “Refrigerating Engineer” for April contains a splendid article on bakery refrigeration. This magazine is printed by the American Society of Refrigerating Engineers, of which William S. Shipley of Brooklyn, N. Y., is president.

The article is by H. L. Fischer, of Milwaukee. It deals with air conditioning equipment in the Atlas Bread Factory, as a concrete sample.

The Journal of Industrial and Engineering Chemistry for May features as a leading paper, the address of Dr. H. E. Barnard, director of the American Institute of Baking, at the New Haven meeting of the American Chemical Society. It is entitled “The Chemist Enters a New Industry.”

Chemical and Metallurgical Engineering, of which H. C. Parmelee is editor, contained in its April number an article, “The Incidence of Research on the Baking Industry” by Ellwood Hendrick of the magazine’s staff. It is a splendid article, based on the research work of the Ward Baking Co. The editorial in this same issue should be read by every baker. It details the editor’s satisfaction at recent progress of the baking industry. A far cry, surely, are these articles in the scientific press from the days when George Haffner was dubbed “Doctor of Doughnuts” for suggesting there was a scientific problem in baking of which our chemists and engineers might well take notice.

Quackery, Salt and Vitamins

How Patent Medicine Men Seek Foothold in American Bakers' Ranks

By C. B. MORISON

NOWADAYS whenever a new scientific fact or discovery is announced from the laboratory, it rapidly becomes a favorite theme for the vox popular scientists and other quack propagandists. This is especially the case in the fields of nutrition and medicine which possess an inherent popular appeal and whose data is easily perverted for the propagation of quackery.

The discovery and recognition of the substances now known as vitamins is undoubtedly one of the outstanding achievements of biological chemistry, and it is most regrettable that this new conception which has such important bearings on human welfare, should be so eagerly and greedily exploited by the food fakir and nostrum quack.

Capitalizing on the popular interest in foods and nutrition and a recent remarkable development in the production of a certain type of bread of unusual attributes, the old time patent medicine men have now turned their attention to the baker as a fruitful source of future income.

They conjure him with vitamins and mineral salts and long to benefit humanity by building up a more nutritious loaf which he will pay for by using their preparations. Lately an advertisement built up with the jargon anciently used for selling nostrums and cure-alls was brought to the attention of the Institute. It addressed the baker as "Dear Mr." and informed him that if he wanted to make a nutritious and "soul satisfying whole food" all he had to do was to buy a wonderful salt product at \$22.00 for one hundred pounds f. o. b., subject to change without notice, and add it to the

dough batch on the basis of 2% of the flour. "Dear Mr. Baker" was also told that this was the first time "in the history of bread making that the Baker has even been offered anything to use in his dough which would take the place of the nutritive properties lost to the consumer in the milling and bolting of grains." Another interesting point also stated to "Dear Mr. Baker" was that the stuff "could be used in place of milk and other salt greatly to the advantage of the loaf, for it has a binding effect on the gluten and helps to produce a finer quality," in addition to doing all sorts of fine things for crumb, color, flavor and texture and making a crust which is the delight of "kiddies" and "grown-ups."

He was told further that it was composed of base forming elements which "not only neutralize the acidity of the sponge" and arrest the action of undesirable ferments, but aid in the digestion of other foods, and impart new life and energy to the organism when assimilated. "It contains all the chemical molecules of organization found in any food or in all foods combined." This last claim is one of the most ridiculous and ignorant statements that the writer has ever seen in connection with the advertising of a food product in an experience of many years.

In order to get at the facts a sample of the product was obtained directly from the manufacturer who courteously submitted it to the Institute with a circular letter and folder of testimonials from happy and satisfied clients. Not bakers—but former sufferers from most of the ills that flesh is heir to, such as rheumatism, diabetes, stomach

trouble, gastritis, dropsy, asthma, brass poisoning and other maladies of a rather intimate nature.

The sample as received at the laboratory was contained in a one-pound carton with a pink label which stated the "price per package was \$2.00" and that "Vitamin Salt Food, Vitalis-Sal-Vitalis Brand" was the "greatest domestic, blood, brain, body and nerve salt food ever discovered." Other statements on the label were that "Vitamin Salt Food contains the food vitamins, the chemicals in it ranging from a tenth to a forty-eight hundredth part thereof in every grain."

Examination in the laboratory showed that this wonderful preparation contained about 86% of common salt or sodium chloride, with a small amount of calcium phosphate and a little iron. No appreciable amount of organic matter was detected and nitrogen determinations were negative.

Two dollars a pound is rather a large price to pay for salt, even though it is reduced to \$22.00 a hundred for the use of the baker as stated in the original advertisement prepared for his benefit.

The statement that "Vitamin Salt Food" contains vitamins was not substantiated and the only pronounced effect that 2% of a saline ingredient of this character would have on the bread would be that of salt and nothing more.

Bakers should be very careful before accepting products offered for the purpose of increasing the nutritive value of bread without thorough inquiry as to its composition.

Wanted—A Cake Man

HAVE you ever wanted a cake man like this? Description is by Henry Stude of Houston, Texas:

"I am very badly in need of a cake baker. It is a fine opening for an ambitious young man. I do not want one of the old timers

who measures his skill in his ability to decorate, and his decoration of the Statue of Liberty on top of the ginger bread was so life-like you could even hear the cheering, but when he got off that he could produce about six dollars' worth of stuff if he worked hard all day. He does not have to be especially skilled in baking if he just has tact enough to handle his men and enthusiasm enough to stick to the job, sense enough to make out reports, and intelligence enough to sit down and talk it over occasionally."

From Massachusetts

THE LAST issue of Baking Technology is full of good stuff from cover to cover, although as a matter of fact there isn't any cover. I particularly enjoyed reading the article by David Starr Jordan. I shall read the next edition with increased interest because of the last.

—Alton H. Hathaway, Cambridge, Mass.

Baking Technology is printed as a bulletin from the National Home of the Baking Industry, for all its members. It can never fulfill its function until it is a genuine broadcasting station, with the whole industry obtaining from its columns a comprehension of their common problems and the aims that are universal to all. Six thousand readers out of 40,000 bakers is not the proportion that spells a strong, organized industry.

To a Governor

I AM very much impressed with the article headed "Wheat and Prosperity" in the April Baking Technology. Have taken the liberty of forwarding it to the Governor of Kansas in the hope that it will stimulate him to issue a proclamation on the subject.

—Chas. L. Roos, Secretary, The Hunter Milling Co., Wellington, Kansas.

Books for the Baking Laboratory

OBSERVATIONS ON MILLING. By Edgar S. Miller. Published by the National Miller, Chicago, Ill. 127 pp., 38 figs.

This is a millers' book, for millers only. Its author sets forth its purpose in the very first paragraph of this introduction when he says:

"The writer is not attempting to create interest; he assumes that among those that read this book interest already exists. His object is not to teach the art, or science of milling, but to study it. If there are those who want to learn with him it is hoped that these observations may serve a useful purpose.

"With this end in view it is proposed to consider the subject from its practical side. Common words and phrases—words that are understood by millers, bolters, oilers, and others of average education—will be used as much as possible."

Thus at the very outset Mr. Miller takes a stand unusual to authors, and to men in general. Instead of mounting a "high horse" and looking away down upon those he would address he comes at them in as nearly as possible their own experiences and their own way of thinking. Such a book on any subject belongs to the most valued possessions of the world.

There is plainness, directness, sincerity in this book about milling for millers, and even for mill hands. The baker has come to a time in his career when he must know much more about milling than he formerly thought it necessary to learn.

This is so because millers have come to a time in their own work when they are reaching over to learn much more about bread than they formerly knew. To sell flour they are advertising bread these days, and that means a revolution in the world in attitude and horizon.

If the baker responds by gaining a sympathetic and reciprocal knowledge of milling, it will make easier and easier the growing contacts between these two great branches of the wheatstuffs industry. To any interested baker this volume will supply full information on the operations wheat must undergo before it is ready for manufacture into white bread.

The author is to be commended for the many excellent drawings made from actual samples under the microscope. These alone tell the story of milling operations in the clearest manner. The last few chapters of the book with their

discussion of the technique and practice of reduction processes, are of more interest to the miller than the baker.

A clear illustration of the separation and direction of the milled products into certain grades of flours is lacking, but we are promised a more complete picture of this phase of milling in a second volume by the same author under the title, "The Analysis of a Flow Sheet." The two companion volumes should make a valued pair of reference books in the baker's library.

L. A. RUMSEY.

DAIRY BACTERIOLOGY. By Dr. Orla-Jensen. P. Blakiston's Son & Co., Philadelphia, Pa., 1921. 174 pp., 70 figs.

Milk has become an important ingredient in the commercial manufacture of bread, therefore the baker should acquaint himself with the proper methods of handling milk.

Dr. Orla-Jensen of the Polytechnic College of Copenhagen has prepared an excellent book on dairy bacteriology. The author presumes that the reader has an elementary knowledge of dairy practice and bacteriological technique. The book was written primarily for the student and technical man. However, the layman I am sure can understand most of the material in the book especially the parts dealing with the care and handling of milk.

A brief survey is given of micro-organisms and fermentation and a short discussion of bacteriological technique. The organisms that have to do with dairy practice are discussed at some length, with necessary detail attached to each helpful and harmful micro-organism. The question of pure milk has attracted international interest. The baker demands quality ingredients. The material presented shows the baker how all kinds of dairy products should be handled, and discusses the defects that are liable to arise in dairy products.

The closing chapter of the book gives a number of tests for the grading of market milk.

H. E. T.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Vitamin Underfeeding. W. Cramer. Brit. J. Exptl. Pathol. 3, 298-306 (1922).—Observations have been made on a stock of rats which have been kept through many generations on

a natural diet, the vitamin content of which, though restricted, was adequate to enable them to grow and breed and to prevent the occurrence of obvious ill-health. A comparison of rats from these stocks with animals from a stock fed on the same diet supplemented with an abundant supply of vitamin shows that there is such a condition as "vitamin underfeeding" and that it may occur on a natural diet. Such vitamin underfeeding does not lead to any obvious ill-health; the animals are in appearance normal, healthy animals. But vitamin underfeeding, especially if it has occurred in infancy, impresses itself upon the organism as a lasting weakness which only manifests itself when the organism is exposed to a strain. Hence the importance of insuring an abundant supply of vitamins in the food, especially to the pregnant and lactating mother and to the growing child. The fact that vitamins have a positive, stimulating drug-like action and thus act as food hormones is put forward to replace the present conception of their mode of action. These conclusions open upon a social aspect of the vitamin problem which has hitherto not been recognized, but which is at least as important as the actual production of diseases by a severe vitamin deficiency. They suggest that the physical make-up of a community is determined largely by the ease and regularity with which an abundant supply of vitamins is secured to the pregnant and nursing mother and to the growing child.

HARRIET F. HOLMES.

Determination of the Acidity of Flour. M. Arpin and (Miss) M. T. Pécaud. *Ann. fals.* 15, 283-8 (1922).—The acidity of flour varies with the per cent of extraction in milling and the age of the flour. It should not exceed 0.050% in wheat flour which has been stored only a few months. It can, however, reach 0.125% and still give a perfectly satisfactory bread. In judging of the soundness of a flour, the acidity determination is of value only when taken in conjunction with other tests, e. g., increase in sol. N., decrease in fat, sol. gluten, quality, etc. The most satisfactory medium for the determination of acidity is 90% alc., and the best indicators are (preferably) freshly prepared tincture of curcuma or phenolphthalein, with 0.02 or 0.01 N alc. KOH. The results of comparative tests using water and alc. as media show that much more const. results are obtained with alc. Also in *Ann. chim. anal. chim. appl.* 4, 262-6 (1922). A. P. C.

Can Yeast Be Used as a Source of the Antineuritic Vitamin in Infant Feeding? A. L. Daniels. *Am. J. Diseases Children* 23, 41-50 (1922). *Expt. Sta. Record* 46, 759-60.—Attempts to use yeast in place of wheat embryo ext. previously recommended by Daniels, Byfield, and Loughlin (C. A. 14, 1137) or pancreas ext., as recommended by Eddy and Roper (C. A. 11, 1851) as a growth stimulant in infant feeding are reported, with illustrative charts of the resulting weight curves in 8 of the 11 cases reported. The addition of the yeast, even in small amounts, generally resulted in diarrhea. In some cases slight stimulation in growth was evidenced and in others none at all. D. concludes that yeast should not be used as a means of increasing the antineuritic contents of infants' foods. H. G.

The Growth-Promoting Properties of Milk and Dried Milk Preparations. J. M. Johnston. *U. S. Publ. Health Repts.* 36, 2044-57 (1921). *Physiol. Abstracts* 6, 509. The process of drying skim milk by the spray process does not injure the water-sol. vitamin. In feeding albino rats with a basal mixture of purified foodstuffs plus milk of any kind, it is necessary to have $2\frac{1}{2}$ parts of milk to 1 of mixture to ensure normal growth. Excessive amounts of milk cause subnormal growth after a time. H. G.

Nutritive Value of Raw, Cooked, and Powdered Milk. G. Petraghani. *Rend. d. adunanze d. accad. med-fis. fiorentina; Sperimentale* 76, 239-44 (1922).—Fresh milk prolongs the life of pigeons fed on devitaminized grain, while sterilized and powdered milk aggravate the symptoms. In cats, raw and boiled milk gave the same picture, while it was shown that milk could be disinfected by heating at 65-8° for 1-2 hours without destroying the "indirect oxidases." Dryco was a complete food, while milk autoclaved in glass and conserved was incomplete. M. HEIDELBERGER.

Vitamins and Nutrition. M. J. Lewi and H. E. Dubin. *N. Y. State J. Med.* 21, 269-70 (1921); *Abstracts Bact.* 5, 346.—A resume. H. G.

Antineuritic Vitamin in Skim Milk Powder. J. M. Johnston and C. W. Hooper. *U. S. Publ. Health Repts.* 36, 2037-43 (1921); *Physiol. Abstracts* 6, 509.—Pigeons fed on mixtures of spray process skim milk powder with polished rice require 30% of the food in skim milk powder to avoid polyneuritis. This equals about 75 cc. liquid milk daily. H. G.

Do You Want These Tariffs?

They Are In Effect, But Can Be Changed by Concerted Effort

EVERY baker who has tried substitutes for eggs, milk, cream, knows that there are no substitutes for these important articles. The reason is simple. All are nature's foods built with a strong appetite appeal in them.

No chemist ever yet conceived a substitute for a natural food that could carry with it the appetite appeal of nature's original.

Many bakers who bought thriving businesses only to see them ruined in a short time know now that they paid the heavy toll of lost trade by trying egg and milk substitutes. The man who built the business that looked so inviting had never tried substitutes for the appetite-provoking natural ingredients.

Now comes the baker's opportunity. The Tariff Commission was appointed to equalize high points in the tariff. The last congress was very responsive to rural demands, and raised the tariff on frozen eggs 4 cents per pound.

America was importing at the time 40,000,000 pounds of frozen eggs, broken when they were perfectly fresh under ideally sanitary conditions. The raise in tariff of 4 cents per pound saddled a bill of \$1,600,000 per year on the baking industry. Egg importers don't care much, for they have already found they can pass it on to the bakers. Shall bakers care or just pass it on to the consumers and say nothing?

It is "up to the industry." American Bakers Association has plenty to do and very scant funds to do it with. Write in if you want this fight made. It will be persistent work in Washington.

Some bakers seem to think their National association should do everything they want done without their ever raising a hand to

certify what appeals to them as essential.

In the matter of eggs the tariff on dried albumen was raised from 3 cents to 18 cents per pound. This means also several millions per year. The real party at issue is the housewife. Will she make her wants known through the baker or by herself independently?

Several of the tariff commissioners have been interviewed on this theme. They seemed responsive and wished to have the case for baked goods made formally before them.

One large importer has seen in the present situation a death knell to his business and he has decided to close it out. That only means an added load on the domestic egg supply that will boost the shell egg market along with all others. It will make the baker a competitor with the housewife for his daily egg supply. This is the situation. What do you think about it? Write the answer in to your association headquarters.

Women Want It Wrapped

IN SOME parts of the South, bakers find their customers resenting wrapped bread because they want it hot and hot bread will not take a wrapper successfully.

In Louisville, Ky., however, the women have risen above the hot-bread situation. The Women's City Club have organized a society for "wrapped bread only." It has a pledge card and distributes to its members a list of all bakers wrapping their loaves. Those singled out for such "honorable mention" are The United Baking Co., The Tip Top Baking Co., The Quaker Maid, Inc., Nick Warisse Baking Co., Grocers Baking Co., Whitesides Bakery Co., and Linker Bros. Bakery.

BAKING TECHNOLOGY

*A Journal of
Applied Science
in Baking*



*Published by
The American Institute
of Baking*

VOL. II

CHICAGO, ILLINOIS, JUNE 15, 1923

No. 6

The Nation's Leaders Confer

WHEREVER you are, Mr. Baker of Bread, you will want to keep your eyes on the Hotel Sherman, Chicago, June 19 and 20. There will be men at the Sherman who want to know all about you, and all about ways to help you.

Few of them will be bakers. Most of the leaders will be men who know more about keeping the ship of state on even keel than about anything else. They are men who realize that the baker

is one of the many steps in the progress of wheat from farm to consumer's table.

They want, as national leaders, to see

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that the baker gains every bit of help he can to carry his product into every American home. They see the story of the loss of prosperity on the farm, that came from the loss of the farmers' wheat market. They know that they themselves worked heroically during the war to "take the eat out of wheat," and that now the farmer has been called on to pay—and pay almost alone—for the tragic post-war condition in which he has a sur-

plus of wheat on his hands, and no way to buy those things he buys when he is able to turn wheat advantageously into cash.

Here are the nationally-known men who have put their shoulders to the plow to till the baker's furrow—because it also is their furrow, and the furrow of every man in America who prospers when the country as a whole prospers: Arthur Capper of Kansas, United States senator and owner of many farm papers which have long been famous for their work in interpreting the farmer's work in life; J. A. O. Preus, governor of Minnesota, in the heart of wheat-raising country, where he learned what it means to have sale-less wheat; Len Small, governor of Illinois; Jonathan H. Davis, governor of Kansas; Arthur M. Hyde, governor of Missouri; R. A. Nestos, governor of North Dakota—another state that knows wheat from the standpoint of "dirt farmers;" A. V. Donahey, governor of Ohio; John C. Walton, governor of Oklahoma; Royal S. Copeland, senator-elect from New York, who as health commissioner, learned long ago the rôle of wheat in nutrition; Charles S. Barrett, president of the National Farmers' Union; O. E. Bradfute, president of the American Farm Bureau Federation; S. J. Lowell, master of the National Grange; George E. Chamberlain, who as governor of a wheat-growing state and as United States senator, learned to know the farmer's relationship to politics as few American statesmen do; and Aaron Sapiro, counsel in agricultural economics. Sapiro is a modern thinker who has seen his thinking go into action in the form of scores of co-operative marketing associations. Marketing laws in many states are of his writing, and his fame is as broad as the wide acres of our agricultural domain.

An Example

If there are any ways to make bread more acceptable to the people these men, and thousands of their associates in no way connected with the baking industry, want to know what these ways are and how to open

them. For instance, one of the famous men who will attend this conference came rushing up to an officer of the American Institute of Baking, and said:

"That is a great idea of yours—that idea of getting up a toast standard which will guarantee good toast. The hotels and restaurants must get that idea. You must preach it in their papers as well as in the baking papers. What do we get now in hotels? Why they use stale bread for toasting—with a dash of water thrown over it. They do this even in the good hotels where they charge 20 cents an order. Hotel and restaurant toast is rotten!"

This enthusiastic attender of the wheat conference was informed that American Institute men had heard of a restaurant which placed electric toasters on every table and allowed the patrons to make their own toast.

"Great idea," he quickly responded. "I'll tell George about that—George is the head waiter in the hotel where I make my home."

Thus the story goes. One inspirational idea piles upon another, and out of the welter new and spontaneous activities take life where they were least expected to.

Pretzels Neglected

And what about pretzels and ice cream cones? They, too, are wheat products. Bakers have talked about the macaroni baker, the bread baker, the pie baker, the cake baker, but not a word about the pretzel baker. From his corner in our industry up speaks Mr. Pretzel Baker in the person of L. J. Schumaker of the American Cone and Pretzel Co., of Philadelphia, Pa.

"One of the trying features of the editor's job," he writes with a considerateness that is veritably astounding, "is the impossibility of pleasing everybody. We know something about an editor's trials and have hesitated to write you, but our industry has been slighted, and we have been slighted, and you

wouldn't know anything about it unless we told you so, so here goes.

"On the inclosed page of BAKING TECHNOLOGY you refer to certain different kinds of baked goods. If you had said only sweet goods, bread, and crackers, we would not have thought so much of it; but when you specifically mention pies and macaroni, and omit adding pretzels and ice cream cones, our industry feels neglected indeed.

"Please remember there are several hundred thousand barrels of flour per year baked into pretzels and ice cream cones in this country."

Indeed the fact of our pretzel supply will be duly noted! The word has been flashed to all "Wheat and Prosperity" speakers to count in the pretzel men. And how different is this voluntary appeal from them, to be counted in among the members of the Wheat family, from those visits the American Institute received a year ago. Then it was more likely to be: "You are the bread bakers only. You have nothing for me." And "me" might be a retail baker, a cracker baker, or a cake or pie baker. Our family tree enlarges with every passing day. The new branches upon it seem to leap into full-sized growth, almost before they make their presence known.

A Macaroni Conference

The "Wheat and Prosperity" movement is responsible for bringing together the largest conference of macaroni manufacturers ever assembled at one time. It was convened at Cedar Point, O., to make sure that the macaroni people should not be passed by in this "Eat More Wheat" crusade. They maintained that macaroni was "the grocer's meat" and that they could so advertise it, and take advantage of the national effort of farmers, millers and bakers.

The macaroni makers had another plea. It was that besides the wheat for bread, American farmers raised 72,000,000 bushels of Durum wheat, of which all but 19,000,-

000 bushels is annually exported. They are determined not to have the bread bakers gain all the advantages, and so are set upon doing their own part, rather than sitting back to become mere beneficiaries of the work of others who are more active.

Your Part at Home

On another page in this issue you will be able to read how one baker did his part at home—and opened the way for scores of other bakers to do their part, each group in its own locality. Watch this movement grow and see for yourself when it comes your turn to "carry the ball," and make a run for the goal that is now open to our industry.

Water at \$5.50 a Gallon

EVEN in these bootlegging days who would gladly pay \$5.50 per gallon for plain, distilled water? Many have paid much more for something very close to plain water, but they did not know what they were doing. One baker had a chance to make just such a purchase last week and he was about to consummate the deal when he encountered a bit of advice that he consult the American Institute's Technical and Service Department.

The baker operated a large fleet of trucks, and he was offered a wonderfully efficient, entirely new storage battery liquid. It was guaranteed "to make old batteries new again" and to perform several other similar wonders. The price was only \$6 per gallon. After an analysis had been made, A. W. Landstrom, chief of the analytical laboratories, made some of the wonderful liquid out of distilled water and sulphuric acid at a cost of 50 cents per gallon. The liquid made up in the laboratories was even an improvement upon the "battery fluid" for it contained pure sulphuric acid, whereas the fluid received for testing contained impurities which would have caused a battery to discharge itself and become worthless.

Bakers Who Did Their Part

How Groups Got Together in Various Cities and Co-operated on Advertisements Telling Wheat's New Story

THE new story of wheat, to which the American people are slowly arousing themselves, is that the World War taught them wheatless habits that now devastate farm prosperity. The story is that they must "reverse English" in their war-born attitude towards wheat food in order to save the farmer, just as they once saved the Allies by making the eating of wheat foods in America something very like a crime.

Here is the story of what one baker undertook "in order to do his bit," in the new wheat-food crusade. Instead of sitting idly by while others forged a way for the new national message to American consumers, Alex Taggart of Indianapolis invested several thousand dollars in the newspapers of his city. At the American Institute of Baking he had heard the situation of the wheat farmer set forth in a general conference. He absorbed the idea of what it was all about and, when he returned home, he took action. He did this on behalf of the committee on publicity and advertising of American Bakers Association, of which he was chairman.

But this is only the beginning of the story. What followed makes one of the glowing chapters in the epic of the new co-operative spirit growing up in the baking industry.

Bakers from all parts of America wrote in for copies of the full-page advertisement, stating that they would like to reprint it in their cities. It is reproduced on the adjoining page so you can see just what it is all about.

The demand became so enormous that Mr. Taggart had another idea. It was to have 5,000 reprints made and distribute them

generally to the industry. Some were sent to advertising companies with the suggestion that they approach their customers with the idea of having them join in such advertising at this time. Other copies went to bakers, suggesting that they reprint them in their local papers.

Result? An advertisement that went the rounds of the American press, in which BAKERS told the "EAT MORE WHEAT" story instead of leaving the burden to others. The American Institute of Baking, where Mr. Taggart gained his original inspiration, also served in the distribution of copies of the advertisement.

In New Orleans

In New Orleans seven bakers and one supply company co-operated to pay jointly the cost of reproducing the advertisement. They added a paragraph of their own. It was to the effect that they wanted to see the farmer prosper for selfish reasons entirely—so that their own prosperity might be permanent. The firms that co-operated "down by the levee" were the General Baking Co., Bacher Bros., Joseph Reuther, Wm. Sehart & Son, J. Jensen Baking Co., Inc., Ancona's Bakery, Hoehn Baking Co., the Geo. H. Leidenheimer Baking Co., and J. S. Waterman & Co., dealers in flour and bakers' supplies.

An Arizona Case

This co-operation between bakers and allied trades was kept up also in several other cities. In Tucson, Arizona, George A. Stonecypher inserted the advertisement in the *Arizona Daily Star*.

Other cities took up the good work. Among them were cities as far apart as San Francisco, Wichita, Marion, Chicago, New York and Hillsdale, Mich.

AMERICA'S FATE Again Depends on A SLICE OF BREAD

Wheat. More Wheat. AND STILL MORE WHEAT. That was the urgent call from the battlefield, when, with bated breath we waited for news of Hindenberg's latest advance, or read the casualty columns that told the story of a few yards of Argonne hillside purchased with precious American blood.

It was not difficult then to convince people that the fate of our nation depended on the saving of a slice of bread a day!

And so—at the risk of seriously impairing the vitality of the folks who stayed at home—Americans abstained from eating wheat—and the war was won!

Again—America's fate depends on a SLICE OF BREAD.

The nation which a few short years ago was taught to eat LESS wheat must today be shown the necessity of eating MORE wheat.

—or else we impair the structure on which our prosperity is built—and pull the props from under the business activity which is giving the American workman the good wages and living conditions which he is enjoying today.

For, in the last analysis, WHEAT is the foundation of all wealth. It is the standard by which all agricultural values are measured.

Give the farmer a fair price for his wheat crop and you give him the power to build homes, erect silos, buy farm equipment, motor cars, clothing, furniture, amusements!

Deprive him of that fair price for his wheat crop and you so limit America's purchasing power that untold thousands living in cities and towns must be shut out of employment.

A fair price for the wheat-crop means smoking chimneys for American factories—and a full dinner-pail for American workers.

A too-low price on wheat, or an unsold wheat crop, means soup lines—poverty—distress.

A fair price for the wheat crop means a quickening of the pulse of business—AND A BASICALLY SOUND PROSPERITY.

A too-low price on wheat, or an unsold wheat crop, means a hardening of the arteries of commerce—a shriveling up and dying trade activity.

AND TODAY THE FARMER IS NOT MAKING MONEY.

You may not think that this situation affects you. But it does.

You may not think that it is within your power to remedy. But it is!

Your job tomorrow depends upon how much bread you eat today! And we use the word "bread" merely as typical of all wheat products—rolls, crackers, cakes, pies, macaroni, spaghetti, biscuits, flour gravies, breakfast-cereals.

In whatever form you most prefer wheat—it is up to you to consume more of it—or suffer the dire consequences which follow business depression.

Here Are The Basic Facts

Today, though millions of Europeans are crying for bread, there is so little purchasing power in all Europe that

—1,800,000 bushels of American wheat can not be sold abroad at a living price.

This means that 35,000,000 barrels of flour cry for some one to make them up into bread.

Unless the American nation consumes that 175,000,000 bushels of surplus wheat, America will again see her farm lands plastered with mortgages.

No true American wants that to happen.

And yet there is no way to sell the surplus wheat at a fair price except to dispose of it to Americans.

The Simple Way Out

Look at this problem in the aggregate and it seems impossible of solution.

Divide it by the one hundred and ten millions of people who ARE America—and it is easily solved.

For if each of those one hundred and ten million Americans will eat just ONE MORE slice of bread at each meal, or its equivalent in wheat foods, the whole surplus will be absorbed.

So, you see, the fate of America DOES depend on a slice of bread—an extra slice three times a day.

That slice of bread will keep the farmer from having to sell his wheat at a loss—thereby hurting the market for ALL farm products.

In addition, that extra slice of bread will cause the farmer to raise and use 162,500,000 bushels of CORN to feed the hogs from which to make the lard for baking the extra bread.

—and another 1,500,000 bushels of CORN to be used in making the yeast required for this extra baking. 4,375,000 hogs of 200 pounds would be required for the lard.

1,533,000,000 pounds of milk for the baking—to say nothing of untold amounts of butter, cheese, jelly and jams, meats and vegetables to make the meal complete.

40,000,000 yards of cotton goods would be required for the sacks to hold the flour!

Much activity in steel will result in order to maintain transportation facilities in handling this extra tonnage of food.

Still more steel will go into automobiles, trucks, tractors and farm implements to fill the demand created by the renewal of PROFITABLE operations on the farm.

In a word—your extra slice of bread will bring the greatest period of substantial prosperity ever known to American business.

There can be no bed-rock prosperity in any nation until the FARMER is prosperous.

There can be no bed-rock prosperity in America until the farmer is assured that his surplus wheat crop is going to be marketed.

Are you willing to give him that assurance today?

Do it by eating an extra slice of bread at each meal—today and tomorrow—and thenceforward.

You will be better and stronger because of it.

For wheat is not only the basis of all farm-values—it is also the basis of the worth of all physical well-being. In connection with the dairy products always incident to its use—wheat is the universal food. It is alive with vitamins. It builds stamina. It makes better men and women.

So you see it will PAY you—in health as well as prosperity—to eat that extra slice of bread.

This statement, though paid for by the Taggart Baking Company, is NOT intended to sell only Taggart's bread.

We are publishing it because we are convinced that, unless the farmer sells his wheat—all of it at a fair price—the time will soon come when you will not have enough money to BUY bread—or anything else.

We feel this to be true because of our intimate relation to the farm market as substantial purchasers of flour.

If others who depend on the pocketbook of the American family were as close to agricultural problems as we are, this advertisement MIGHT have been signed by a department store, a banker, a working man, or an automobile factory.

EAT MORE WHEAT

[An Ad. that was sent by Members of American Bakers Association clear around the world.]

Fleischmann No-Time Dough

*It Is Demonstrated to Baking School's Students in Series of Tests
by Julius E. Wihlfahrt*

THE DEVELOPMENT of methods for producing what is commonly termed "No-Time Dough" is again commanding considerable interest in the baking industry.

"No-Time" doughs which have for their object the reduction of the fermentation period to the minimum, and the elimination of the time ordinarily consumed in the dough room, may be produced by a number of methods,* the chief object of which is to influence the rapid development of gas for aeration of the dough with production of the optimum hydrogen ion concentration.

This can be accomplished by increasing the amount of yeast, by the addition of acids and acid compounds for the rapid development of the acidity or hydrogen ion concentration, and by the employment of a higher range of temperature during mixing and proofing.

The method recently brought out by the Fleischmann laboratories, under the direction of R. L. Corby, is based mainly on the employment of high temperatures during mixing and proofing. This results in the stimulation of enzyme activity with rapid production of gas, while the acidity or hydrogen ion concentration is rapidly increased at the same time. The character and acidity of the type of malt extract used is also a factor in this connection.

The Fleischmann method was successfully demonstrated to our students in the bake shop of the American Institute of Baking by J. E. Wihlfahrt, bakery consultant of the Fleischmann Company.

Observations on the process made at this time are as follows:

Formula	Lbs.	Ozs.	Per cent
Flour	150	0	100
Water	86	8	58
Salt	3	0	2
New Diamalt	3	12	2.5
Sweetened Condensed Milk	7	8	5
Yeast	3	12	2.5
Shortening	3	12	2.5
Yeast Food (Arkady) ..	9		.375
1—Temperature of dough mixed			90°F.
2—Time of mixing			15 mins.
3—Weight of dough from mixer			255 lbs.
4—Weight of dough to divider			255 lbs.
5—Temperature of dough room			80°F.
6—Time from mixer to divider			17 mins.
7—Temperature of dough to divider			91°F.
8—Temperature of overhead proofer ..			79°F.
9—Temperature of dough in overhead proofer			87°F.
10—Temperature of dough to proof box ..			86°F.
11—Time from divider to proof box			22 mins.
12—Average temperature of proof box ..			99°F.
13—Temperature of dough in proof box ..			90°F.
14—Time of proof			45 mins.
15—Average oven temperature			450°F.
16—Time of baking			54 mins.
17—Total time from mixing to bread on rack			160 mins.

HYDROGEN-ION CONCENTRATION

pH DETERMINATIONS*

	pH
1. Dough out of mixer	5.8
2. Dough at divider	5.4
3. Dough to proof box	5.2
4. Bread	5.3

* Approximate values.

SCORE OF BREAD

External Appearance	Score
10—Volume	9
8—Color of crust	7.5
3—Symmetry of form	2.5
3—Evenness of bake	2.5
3—Character of crust	2
3—Break and shred	2.5
Internal Appearance	
10—Grain	7
10—Color of crumb	7
15—Flavor	13.5
20—Taste	18.5
15—Texture	13
Total	85.0

Our students were keenly interested in the bread produced by Mr. Wihlfahrt and for a week after the demonstration continued to make doughs from his formulas.

* Confidential Bulletin No. 2, October 15, 1922. Issued from the Office of the Secretary and Business Manager, American Bakers Association, 1135 Fullerton Ave., Chicago, Illinois.

Feeding Tests on New Breads

A Preliminary Report on Experiments to Determine Their Nutritive Value

By C. B. MORISON AND G. W. AMIDON

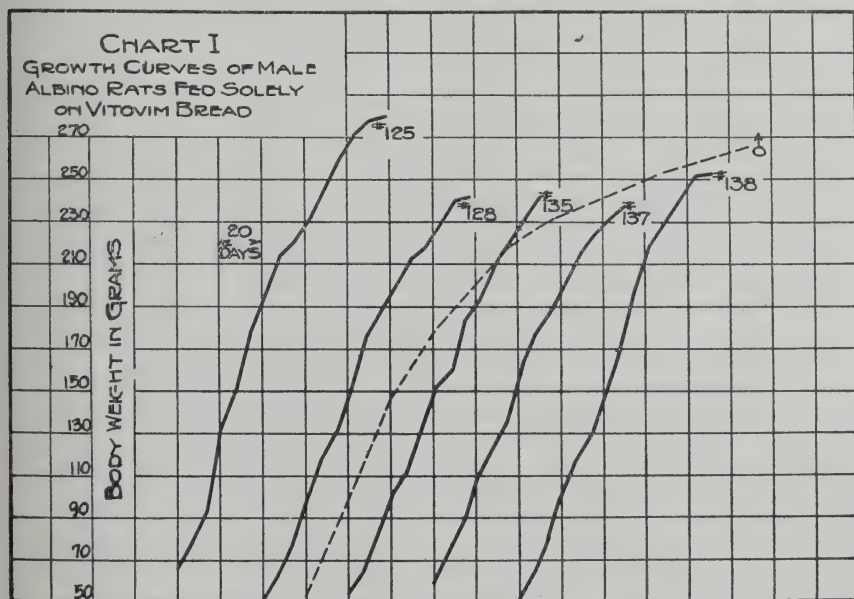
Of the Research Department, American Institute of Baking

THE Institute has been engaged for some time on a series of feeding experiments concerned with the claims made for certain special breads and vitamin concentrates recommended for use in bread formulas.

Some of these data have already been reported in connection with the investigation

cept water, indicates the rapid increase in weight secured over a feeding period of over 100 days.

The Vitovim bread used in these experiments was purchased on the open market from the Chicago grocers and is thus representative of the bread as offered for sale to general consumers.



of the nutritional advantages of bread containing milk.

Preliminary experiments with Vitovim bread of the Ward Baking Co., are now in progress and the accompanying graph showing the growth of male albino rats when fed this bread as the sole article of diet, ex-

It was delivered to the Institute as wrapped loaves of either one pound or one-and-a-half pounds weight.

Further data which we have obtained on Vitovim bread and other breads containing vitamin concentrates will be published later, as determined by the progress of the work.

A New Piece of Research Work

Food Research Institute of Stanford University Begins Inquiry into Delivery Costs

BAKERS everywhere will receive within a short time, a questionnaire about costs of delivery service. It may be looked upon as a "bothersome thing" unless the baker receiving it stops to consider that it has been sent out with the full sanction and support of American Bakers Association.

The questionnaire is sent out as a basis on which to determine whether gas, electric, or horse-drawn trucks are most efficient in making bakery deliveries. It is sent by the Food Research Institute of Stanford University. This Institute was founded through the efforts of Herbert Hoover to collect data about food of importance to the nation as a whole. Not only has general co-operation been promised to it by American Bakers Association, but its experts, such as Carl L. Alsberg, Joseph S. Davis, and Alonzo E. Taylor, consider wheat problems so vital that their first year has been given over to them almost entirely.

Charges have been spread in the public press that bakery delivery costs are "extravagant." The answer of the industry is that it is investigating to find out the most efficient delivery system that can be devised. Each baker's part is to answer the questionnaire and send it in, together with all other information available. Several representative bakers have already done this.

The following letter of indorsement and approval has been sent out by the Committee on Economic Research, American Bakers Association:

To the American Baking Industry:

The inquiry by the Food Research Institute, of Stanford University, California, into the principles underlying the selection of delivery equipment is of fundamental

importance to the baking industry. If properly supported, it should result in material benefit to the industry. The questionnaire which the Food Research Institute is about to circulate among bakers has been carefully worked out in consultation with practical bakers and seems to us well calculated to yield information essential to an understanding of the subject.

The Food Research Institute approaches the problems of the baking industry from an impartial and disinterested point of view and seeks only to do what it can to suggest improvements and economies in the distribution of a staple foodstuff. In this instance it is dealing with a problem which is engaging the best thought of many bakers individually. Its conclusions upon the subject promise to be of real value in promoting sound decisions in a matter involving heavy expenditures.

We sincerely hope that bakers generally, whether members or non-members of the American Bakers Association, will give this inquiry their whole-hearted support and will not hesitate to put at the service of the Food Research Institute the information called for by this questionnaire.

Signed: W. E. LONG,
A. L. TAGGART,
H. D. TIPTON,
Committee on Economic Research,
American Bakers Association.

June 15, 1923.

More Library Gifts

A FEW weeks ago a letter was received at the American Institute of Baking bearing the information, couched in the most modest terms, that a box had been shipped to us, which contained the entire issue of the

National Baker from the time the first volume was issued on February 15, 1896, up to the last volume, dated June 15, 1922. These volumes were presented to the library by Mr. B. F. Whitecar, for twenty-five years the managing editor of the *National Baker*, and who, upon consolidation of the *National Baker* with *Bakers' Weekly* on July 1, 1922, became a member of its staff.

On arrival the box was found to contain, besides the journals, some very interesting pamphlets which have been incorporated into the library. This collection, together with the twenty bound volumes of *Bakers' Helper*, which were presented to the library by George Haffner of Fort Wayne, Ind., some time ago, constitute one of our library's most valuable assets, and to the man who has the necessary vision to begin work on a "Handy Book" for bakers, they will prove to be an invaluable fount of knowledge. All the advertisements have been bound in with these journals, and it is an education in itself to study them, for they prove, as nothing else in baking literature will, what tremendous advances have been made in the mechanical end of the baking industry during the last twenty-five years.

A most interesting and valuable pamphlet has been added to our files. This is the catalog of the Chidlow Institute, Ward-Corby Company, Pittsburgh, Pa., dated 1904. It will be remembered that Mr. David Chidlow was the pioneer in the study and teaching of the science of baking and blazed the trail for the scientists and educators who followed after. For this we are indebted to Mr. Edward T. Clissold, editor of *Bakers' Helper*.

—R. E. P.

A Salesman-Student

WHEN men from the American Institute of Baking go out to bakers' conventions flour salesmen often ask them "if it would pay a flour salesman to take a baking course." It happens that the School of

Baking of the American Institute of Baking now has seven students from milling concerns who have been, and will return to their various companies to be again, flour salesmen.

Before they came here old flour salesmen shook their heads at the idea of going to a bakers' school. They insisted that the business of the salesman "was to sell flour," and that any effort to go further would get him into quarrels with the baker, "who would naturally feel his way was best whatever the flour salesman might think about it."

However, the first seven applied for admission and are now half way through the course. One of them, H. Stanley Roper, was asked how he found the work, from the background of four years' service as city salesman in Chicago for the Washburn-Crosby Company.

"In my former work," he replied, "I could only pass on the word to the office when anything was wrong with flour, or bakers made that kind of an assertion. The office would send out a 'trouble man.' And beyond that routine way of handling things I never could go.

"But now it will be a real delight to talk bread to a bread maker. I already can cut open a loaf of bread and tell whether it is from a young dough or an old dough, whether too much or too little salt was used, and how it was handled in the mixer and proof box.

"From what I have already learned I am now able to see where bakers formerly blamed the flour man for a great many things that he was in no way responsible for. Handling flour, I find, is a mighty important element in baking and there are so many ways to handle it wrongly that most of the troubles formerly blamed on flour ought in fairness to be shifted to the matter of its handling, and to the ingredients with which it is mixed."

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

Published by the
AMERICAN INSTITUTE OF BAKING
1135 Fullerton Ave., Chicago

Entered in the post-office at Chicago, Illinois, as second-class matter, under the act of August 24, 1912.

Price, Fifty Cents a Number; Five Dollars a Year.
JUNE 15, 1923

Halved—Will It Double?

Our National Convention halved the dues for 1923. Will halving the dues double the membership, and thus stimulate the spirit of share-and-share-alike in both burdens and benefits?

Time to Go

IS THERE anywhere a baker who is not more proud right now to be part of the baking industry than he ever was before? Everywhere one looks there is reason for joy and a joining of hands that never before clasped in friendship.

We go to meetings of statesmen and public-spirited citizens and almost imagine they are bakers' meetings instead, so thoroughly is the role of the modern baker analyzed. Rotary and Kiwanis clubs give up entire programs to the story of wheat, and the meaning of the baker in the national economy.

Bakers co-operate in jointly paying for advertising, when a year ago they only considered one another as mutual enemies to be feared and mistrusted. The miller enjoys a new enlightenment about baking and bakery affairs. The baker sees the miller in another light entirely, and demobilizes his stored-up fears of the miller as a potential defrauder of his purse.

Within the industry four new lines of development broaden out from the national home of the industry. The "Toast for

Breakfast" campaign brings in a close fellowship with the electric manufacturers. The "Bread And—" advertising propaganda brings us more advertisements every day from butter men, jam men, milk men—showing that "Fairmont's Better Butter Is Best on Toasted Sandwiches," or that Blue Valley butter "goes well with ham, cheese, or hot cakes."

The school of baking pays its way and fills its classes. The service laboratories are "over their heads in work." There is a public responsiveness the industry has never before encountered. Surely here is cause for joy and every bit of it is the joy of team-work in a world that has far too little of that sort of thing.

Wheat—and Ruination

DOES a desperate situation exist on the western wheat farms, or are the prophets of evil on the farms mere "disguised propagandists for the rich millers?"

Some newspaper editors in non-rural communities incline to the latter view. Therefore we respectfully beg leave to call attention to the editorial reproduced below from *The Producer*. This paper is printed for farmers and is owned by farmers. It is the organ of the Northwest Wheat Growers Association. Concerning the wheat situation it says:

"A Washington report states that unless a reduction in freight rates on farm products can be secured in time for next harvest, hundreds of wheat growers will be forced off their farms in interior states like Montana. Numerous banks will also have to close their doors. Not a cheerful prospect. Were the farmers of the country properly organized they could pass on some of the excessive costs to other groups. As it is they seem to occupy the place of the football player at the bottom of the pile."

We may laugh at this view of the farm

situation but the largest wagon and machine company in the Far West went into the hands of a receiver recently. When its agents went to the farms of Utah and Idaho to collect overdue paper they found the farms abandoned, and the farmers off after wage work in the cities. It is this background that gives the national wheat conference its meaning of immediacy and a timely regard for the common weal.

A Friendly Service

HOW many members of the Allied Trades have offices whose walls they would like to grace with a framed picture of the American Institute—national home of the baking industry?

George W. Neary, Fleischmann representative in Dallas, Texas, has such an office and he writes to Dr. H. E. Barnard, director of the American Institute, as follows:

"I am wondering if I could secure a picture of the American Institute of Baking. Have observed such a picture hung in many bakeries and would be glad to hang a copy in my private office where I frequently receive bakers from various sections of the country."

Mr. Neary has a fine idea, for the national home of the baking industry can only be of value to the industry as all interested in baking affairs look to it as a center out of which its voice is made audible to the world at large. Any allied tradesman who writes for such a picture will receive one.

Art for Bakeries

VERY soon after Edward Bok, famous editor and author, landed in America as an immigrant boy he was offered a position as window washer in a Brooklyn bakery. And he washed its windows with a will

—a real Dutch will—as we recorded in our May number.

Since then we have enjoyed hour upon hour with Edward Bok's remarkable autobiography: "The Americanization of Edward Bok." We find that just as he hated a dirty bakery window he hated shabby American cities and when he became editor of a journal with a million readers he wrote up several of the dirtiest. He hated shabby American homes and printed pictures of those he found most beautiful. He printed low-cost plans, so that would-be home owners could escape prohibitive architects' fees.

He attributes all of these activities to his "national Dutch instinct for cleanliness and beauty." As with this Dutchman's life, so it is with the life of every bakery. Beyond cleanliness lies beauty. A window display of cakes and bread can be made a thing of beauty; so can the store selling them; so can the delivery wagons; so can the costumes of sales folk. Theodore Van de Kamp has proved in Los Angeles, as a fellow Dutchman with Bok, that Bok indeed speaks for a "national Dutch spirit," for he has exemplified in bakerydom what Bok has exemplified in our national life at large.

French Lick—and Marengo

EVERY man who has not been down a deep cave wants to go down one—once. At Marengo, near French Lick, is a cave that rivals the Mammoth Cave of Kentucky in size. When American Bakers Association members gather at French Lick Sept. 9, plans already made call for excursions to the Marengo cave. The roads have been found to be in fair condition so that the trip can be made in a single afternoon. This will be only one of the many entertainment features that will make this occasion distinctive among American bakers' foregatherings.

Baking Bread for Uncle Sam

How Army Obtains Good Flour and Good Bread

By MAJOR ROBERT M. LITTLEJOHN, U. S. A.

AT THE present time The Chicago General Intermediate Depot is purchasing approximately 24 million pounds of flour per annum for delivery to various army camps, posts and stations. The Chicago Depot is the army purchasing point for Porto Rico, Panama and the entire United States, except the territory adjacent to San Francisco. The San Francisco Depot purchases flour for the Philippines, Hawaii, Alaska and the aforementioned excepted territory.

The taxpayer is today demanding a greater return for his money than ever before; so in line with the Federal Government's retrenchment policy, the Quartermaster Corps is endeavoring to give 100% efficiency. Requisitions are submitted quarterly by the consuming stations. Wherever practicable, flour is being bought on a minimum carload basis to take advantage of a saving in transportation. Purchases of 40,000 pound lots is, however, impossible for those posts where there are only caretakers or very small garrisons. For the latter cases, carloads are shipped to the nearest distributing point and then reshipped in the same car with other commodities. By buying in large quantities we are able to obtain more competition and better prices. Occasionally the shifting of garrisons or other unforeseen circumstances will necessitate an emergency purchase in the open market, but these will be reduced to a minimum when a final readjustment of the military forces is accomplished.

Flour and Bread

Upon the Quartermaster Corps falls the duty of buying, transporting and storing the flour; baking the bread and delivering it

to the troops fresh daily. Beginning as far back as the Revolutionary War, the army has always had some sort of school to train its bakers and cooks. These schools have developed with the army and are more efficient today than ever before, because of the experience gained in the World War. In all there are nine such schools. This number includes one in Panama, one in Hawaii, and one in the Philippines. They are very necessary for the maintenance of the military establishment, because of the continually changing personnel brought about through retirement, expiration of terms of enlistments, and discharges for miscellaneous reasons. The average recruit received in peace time is inexperienced in any of the trades so the army must train its own specialists. The demand for cooks and bakers is very heavy during the summer months on account of the holding of camps for the Reserve Officers' Training Corps and civilians desiring to take a period of training.

School in Chicago

Prior to the World War the training of specialists in food supplies was more or less haphazard. Fortunately our shortcomings in this respect have been fully realized by the older officers in the Quartermaster Corps and today we have in operation in Chicago a modern school where food specialists are being produced. The curriculum covers instruction in the manufacture, purchase, storage and transportation of every item of food purchased by the army for both man and animals. The present garrison ration for the American soldier authorized 18 ounces of flour per man per day with permissible substitutes in the form of fresh bread, hominy, cornmeal, etc. The families

of both officers and enlisted men (including many on the retired list) purchase their flour from the post commissaries or sales stores. It is, therefore, readily apparent that flour is one of our most important subjects studied.

In teaching the subject to students we begin by a study of the various wheats. This includes actual grading—through courtesy of the Federal and State Bureaus of Marketing. The school laboratory is equipped with a model mill and each student is required to

produce one or more samples of each of the commercial grades of flour before he is allowed to enter the bake shop. We do not attempt to produce graduates to operate post bakeries, because this is the function of our other schools. However, our students must learn the principles of baking thoroughly and be able to determine accurately the quality of samples of flour submitted to them.

For any method of scoring flour and bread to be satisfactory for the army purchasing officer, it must permit the accurate determination of the relative values of a large number of samples within a short time. The system now employed at the Chicago Depot has only been in effect for about eight months, but has proven quite satisfactory. Since it is believed that the reader will be interested in the present scheme of testing flour, the relative weights will be first given and the salient points briefly discussed in their proper order in the narrative.

List of Determinations

FLOUR:	Weight
Granulation	1
Color	3
Gluten, quality	10
Absorption	2
	<hr/> 14
BREAD:	
Weight of loaf.....	2
Volume of loaf.....	6
Form	1
Color of crust}2	
Color of crumb}3	5
Texture	10
Odor and flavor.....	<hr/> 10
	36
Total points	50

In order to produce uniformity and accuracy the weight for each determination is reported on a basis of 100 before applying the weight factor. As will be noted hereafter some of our assumptions are not absolutely accurate but sufficiently so for all practical purposes. A total relative weight of 50 points on a basis 100 each will give 5,000 for a perfect score. With some of our assumptions there may be instances of a flour grading over 100

on some particular thing, but so far out of several hundred tests, no flour has been found that will give a total score equal to or greater than 5,000.

What Soldiers Like

The army desires a good, creamy white color. As is well known, excessive bleach may be considered as an attempt to conceal inferiority. Such flours are always considered as suspicious.

The average baker wants to know how many loaves of bread can be produced from

New Day, New Way

for Uncle Sam's Bakers

To every man who ever served Uncle Sam in the days of the old hard-tack, breadless army, the article by Major Littlejohn here printed will have a strong appeal. No longer do the men too ill to fight, or too misformed to win a line commission, gain assignment in the Commissary. Instead Major Littlejohn trains bakers, cooks, and flour buyers and one of the glories of the organized baking industry is that through its American Institute it can co-operate to see that the best of modern science in bread baking is translated into bread for our country's defenders.

a barrel of any flour. As the army ration allows a specific amount of flour, the amount of water it will absorb makes little difference; hence absorption is given a relative value of only two. A good flour will have an absorption of about 60%, but for convenience of calculation 50% is assumed in accordance with the principles previously outlined. This permits the direct use of each absorption percentage in the score sheet when same is multiplied by four.

Baking formula:

400 grams flour.
13 grams sugar.
10 grams yeast.
6 grams salt.
7½ grams lard (optional).

Water as determined by absorption test.

Naturally the reader will want to know why these proportions are used and not the ingredients to produce a pound loaf. Well, pans of a certain size happened to be on hand in large quantities so the formula was drawn up to produce a loaf fitting the pans. Using 400 grams of flour a loaf of about 600 grams results. Our factor or constant for the score card will then be $100/600=1/6$. As weight has a relative weight of two the score card constant will be $2/6$ or $1/3$.

From experiment it has been found that 400 grams of good, hard wheat flour will produce a loaf having a volume of 2,400 cubic centimeters. Our factor is thus $100/2400=1/24$. With a relative weight of six for volume the score card constant becomes $6/24$ or $1/4$.

The Score Card

We are now in a position to write our score card in the following form:

SCORE CARD FOR FLOUR U. S. ARMY
400 GRAM SAMPLE

THE Q. M. C. SUBSISTENCE SCHOOL

Sample No. Brand.
Name of bidder.

FLOUR

Soundness and odor.
(If unsatisfactory, reject and give reasons)
Scores

Granulation (basis 100 X 1).

Color (basis 100 X 3).
Gluten, quality (basis 100 X 10).
Absorption (per cent X 4).

BREAD

Weight (baker loaf in grams X 1/3).
Volume (in cc. X ¼).
Form (basis 100 X 1).
Color of crust (basis 100 X 2).
Color of crumb (basis 100 X 3).
Texture (basis 100 X 10).
Odor and flavor (basis 100 X 10).

Grand total.

Percentage.
(Divide grand total by 100 and multiply by 2)

CHEMICAL ANALYSIS:

Ash (not to exceed .52%).
Protein (desirable limits 10-12%).
(Tentative limits 9.50-12.50%).

REMARKS:

Inspector.

Each bidder is required to submit a 10-pound sample. These samples are removed from the original bags by the purchasing officer and placed in bags having numbers only. In this way the operator or inspector never knows whose flour he is working with until after the scoring is completed.

Interpretation of the chemical analysis is too well known to call for any discussion. The ash is limited to give what we might call a "long patent." In spite of advocates to the contrary, the private soldier likes his white bread just as you and I. The deficiencies of white bread will normally be remedied in the soldier's mess by feeding the leafy vegetables. We have been desirous of placing a limit of 13% on the moisture content because considerable flour is shipped into warm, moist climates. However, the moisture content cannot be accurately judged from the samples submitted and the Federal limit of 13½% seems to be fairly satisfactory so this point is being held in abeyance.

Oven and Proofing Practice

What is the required score? That is something that must be determined by each operator and depends to a small extent upon a man's personal equation. In running about 100 samples I found my personal equation

to be such that a score of 92% was set as a passing mark. The officers of the purchasing branch at the Chicago Depot obtained approximately the same percentage working independently, so at the present time all flours are scored on this basis. Those that fall below 92 are thrown out and will not be considered. It then becomes a matter of price as to what miller gets the business of supplying any post, provided, of course, that his sample is left in the running.

In proofing, the time to reach the maximum volume on the first rise is considered as 60% of the total time of fermentation. The time for the second rise is set at 30% and the third rise at 10%. Experiments have shown that these percentages give results equally as good as others that have been tried. These are, however, preferable because much figuring is eliminated by using multipliers containing increments of ten. It is estimated that some 600 samples have been tested by this scheme and while there are some minor defects, on the whole it is considered excellent for the purpose.

England "Wants In"

THERE are in the press of England appeals to "eat more" of almost every edible article under the sun, except bread, and some of the appeals are supported by the authority of national trade councils. It is true that some of the articles are not common necessities, as bread is, but specialized preparations, and also that fruit would be eaten in any case. But they have been "boomed" to such an extent that the population have come to regard them as more or less essential to life, if not always superior to bread. There is but one way that bread can be restored to popular favor and that is by a counter advertising campaign of an intensive and sustained kind. To be effective it must be done on a grand scale.

Take the Scotch tweed industry. The

manufacturers before they could effectively advertise the merits of genuine Scotch tweeds, made in Scotland of pure, new wool, had first to form the Scottish Woolen Trade Mark Association. In all such campaigns the initial effort required for the actual formation of the organization was considerable; whereas the baking and milling industries are already sufficiently well organized to go straight ahead with their campaign.

—From *Milling*, London, England.

Putting the "Eat" Back into Wheat

As Seen by a Food Journal

NEW TIMES, new responsibilities! How conscientious we were about "wheatless days" in 1917 and 1918! Do we realize that we have a new opportunity for national service if we work with equal fervor for "wheatful days" in 1923?

To be sure, there is lacking the spur of war-time conditions. It required a fairly callous person to partake casually of a slice of bread, knowing the while that wheat was needed for our men. On the other hand, the shame-faced hiding of a consuming hunger for "a piece of bread and butter," a longing not to be appeased by the best corn bread ever baked, testified to our sincerity and our wish to do our "bit."

Today the task is at once easier and more difficult; easier in that it involves a return to the old "standby," the bread and butter that changes the staff of life into a gold-headed cane, more difficult in that any constructive work along this line means systematic thought in helping.

One of the many gratifying features of the "Eat More Wheat Campaign" is the fact that manufacturers of various food products are seizing the opportunity to do some co-operative advertising. The packer or butter man or milkman who advertises

his products as "going well with bread," literally casts his bread upon the waters.

In the issue of BAKING TECHNOLOGY for April 15, we read: "It isn't any one man's task. It isn't any one group's task. It isn't the task of the advertisers alone.

"It is the farmers' task, the grocers' task, the politicians' task, the President's task, the governor's task, the teachers' task, the industrial leaders' task in every line."

Let's go!

—From the *American Food Journal* for May.

Advisers Reappointed

TIME WAS when scientists who showed interest in any industry would be "reviled into silence" by their brothers of the laboratories on the ground that they had demeaned themselves.

Why, then, do scientists of the National Research Council gladly serve as advisers of the baking industry and of the American Institute of Baking? Is it to help baking to progress as an industry? Certainly not. It is because the baking industry serves the national welfare and is entitled to receive every word of new inspiration and new data that scientific workers have for it. The scientists serving on the National Research Council's Institute Advisory Board know that all scientific progress made by the Institute staff will be translated, eventually, into terms of human welfare and progress.

"At the meeting of the Division of Biology and Agriculture of the National Research Council," writes J. R. Schramm, Executive Secretary of the Division, "the report of the American Institute of Baking Advisory Board was received with interest and the Board was continued without change in personnel. I need not add that the Division is greatly pleased with the form of co-operation, which has been established with the American Institute of Baking."

The men whose service is thus continued

for the Institute are: Dr. W. D. Bancroft, Dr. G. H. A. Clowes, Dr. L. J. Henderson, Dr. E. V. McCollum, Dr. L. B. Mendel, Dr. C. E. Mendenhall, Dr. John R. Murlin, Dr. S. C. Prescott, and Dr. Alonzo E. Taylor.

Help from Home

BAKING TECHNOLOGY is "some little paper," and one is not wearied with endless advertisements. It is just full of help and I certainly enjoy reading it; I am more enlightened after each issue.

—J. F. GEMMING, Blandinsville, Ill.

A Selfish Duty

"YOU OWE it to yourself, to your fellow bakers and to your customers to join the National association of your industry," is what J. Brink wrote to his Michigan friends in the baking industry in inclosing them American Association membership blanks.

We would appreciate very much having you send us, if it is not asking too much, five or six copies of BAKING TECHNOLOGY, issue October 15. Our object in making this request is so that we can provide our traveling salesmen, who are soliciting the bakery trade, with a copy of this issue, for the reason that there is a lot of good stuff in this particular issue that would be of value to them as well as to a great many of the smaller bakers on whom they call.

—DAVID STOTT FLOUR MILLS, INC.,
John J. Morken, Sales Manager.

BAKING TECHNOLOGY is a splendid and valuable publication; I appreciate your suggestion to make known here, in South America, what the American Institute of Baking has created to further more intelligent relations between the baker and the miller.

—HENRY D'ANDRE, Chemical Engineer, Amer.
Assn. Cereal Chemists, San Isidor,
Buenos Aires, S. Amer.

The Press on Wheat

Self Help in Bread

Even a slice of bread, per person, per day, would help the farmer a great deal, it is said. But it would help the person who eats it a great deal more.

—Dayton (O.) News.

Eating Ourselves Rich

Two slices of bread more per day, a great miller estimates, will use up our wheat surplus of about 170,000,000 bushels, and this increase in the consumption of bread, he figures, will lead to the use of enough lard to demand 4,375,000 more hogs, which hogs will eat 162,500,000 bushels of corn, while the milk used will amount to 1,533,000,000 gallons, and the butter to 1,000,000 pounds. Thus, he figures, all America will become richer by eating more.

—Portland, (Ore.) Telegram.

Do You Remember?

Do you remember away back when the old-fashioned bread basket, with plenty of white bread, rolls, rye bread, sweet rolls and perhaps a hard French roll, sat temptingly in the middle of the restaurant table? Now it is gone and the bakers of America find bread eating has fallen off 25 per cent.

—Baton Rouge (La.) State Times.

Best and Cheapest

Bakers have been running a big national campaign to induce us to eat more bread. They urge us that eating more bread would help the farmer. It would help the wheat farmer to be sure, but it would injure other farmers, especially meat growers. If we eat more bread we will naturally eat less of something else. However, BREAD IS THE BEST BET. Highly nourishing. Few foods are cheaper, which may be why Americans are eating less of it.

—Mattoon (Ill.) Gazette.

We Knead the Dough

The millers are urging Americans to use more flour. Possibly they will want the governors to proclaim a "Use More Dough" week when every well-bread man will loaf or go home with a roll. There are no objections so far as we are concerned. Another slice of bread, heavily upholstered with fig jam, is not so bad—especially if its indulgence is based upon patriotic reasons.

—Los Angeles Times.

The Simple Life

The "Eat More Wheat" movement may increase the sale of flour but it is also evident that could the people be sufficiently interested, wholesale living and simple food would be put to the front and a great gain made for producers of food products of all kinds.

—Rockford (Ill.) Star.

Better Than Meat

There is more energy in a pound of bread than a pound of meat. Harvey W. Wiley is given as authority for this statement, showing that bread is the most wholesome and economical of foods.

—Fayetteville (Ark.) Democrat.

Rain—and Bread

"RAIN IN MAY," reads an old Spanish proverb, "means bread for the whole year." And so it did—once. Now it means bread upon the farm only if the farmer can market his wheat and keep his buying power active. That is why American bakers join with all other business, agricultural and political groups in undoing the work of the war that made a piece of bread something too precious to be eaten. The drive ahead is visioned as five years long. Watch this movement grow.

Milk in Bread Making

Experiments Show It Possesses Marked Nutritional Advantages

By C. B. MORISON AND G. W. AMIDON

Of the Research Department, American Institute of Baking

(Continued from the May Number)

IN THE last number a discussion of the constituents of milk was commenced and carried through the matter of milk proteins. In this number the discussion is continued on the subject of milk fat.

Fat is the most variable constituent of milk, and may range from two per cent to nearly seven per cent according to various conditions, such as breed of the cow, character of the feed, season of the year, period of lactation and other influences. Legal standards for fat have been fixed by legislation, but as previously noted, are not uniform in the states. Milk used for baking purposes should be purchased on a guaranteed butter fat basis.

The composition of butter fat is highly complex and the results of various investigators differ widely because of the difficulties involved in the separation of the fatty acid glycerides.

In distinction to the other food fats, it is characterized by notable amounts of volatile fatty acid glycerides, especially butyric, the glyceride of butyric acid, and those of caproic, capric and caprylic acids. While the proportion of olein and palmitin is high, stearin is present in but small amounts. Extensive studies of the composition of butter fat have been made by Browne and others.¹² The characteristic and agreeable flavor of butter fat, which gives it a unique position among the fats used in baking and cooking, is largely due to the volatile fatty acids.

The melting point of pure butter fat is from about 28°C. to 36°C. It has a high coefficient of digestibility and is readily assimilated during digestion.

Recent interest in butter fat has centered largely on its position in the dietary as a source of vitamin A or the fat-soluble A of McCollum. This will be discussed later in connection with the vitamins of milk.

Lactose or Milk Sugar

Lactose or milk sugar is the characteristic carbohydrate of milk and is normally present to the extent of from three per cent to five per cent. It is much less sweet than cane sugar or sucrose and less readily soluble in water than other sugars. Lactose is soluble in about six parts of cold water and two and one-half parts of hot water. In the ordinary fermentation of bread the role of lactose is not important as it is not directly fermentable by bakers' yeast. It may, however, have some significance in relation to the development of acidity by the lactic acid bacterial flora of the dough, but unless the lactose undergoes hydrolysis with the formation of fermentable glucose it will not contribute essentially to gas production. The presence of lactose in milk bread may also have interesting possibilities in relation to certain alimentary disturbances that appear to be alleviated by the ingestion of lactose. The use of milk bread in this connection has not yet been investigated.

Inorganic Constituents or Ash

The ash content of milk is usually about seven per cent and includes necessary elements for normal nutrition derived from both organic and inorganic sources. The reaction of the ash is neutral or faintly alkaline, indicating an excess of base forming elements which distinguishes it from the acid ash of most other foods of animal

origin. The chief constituents of the ash are the phosphates and chlorides of potassium, calcium and sodium.

Comparative analyses of the ash by different analysts are unsatisfactory, but the approximate composition may be given as follows: Leach.¹³

Potassium oxide	25.02
Sodium oxide	10.01
Calcium oxide	20.01
Magnesium oxide	2.42
Iron oxide	0.13
Sulphur trioxide	3.84
Phosphorus pentoxide	24.29
Chlorine	14.28
	<hr/>
	100.00

The high calcium and phosphorus content of milk, renders it especially applicable for the correction of ash deficiencies of products made from patent wheat flour.

According to Sherman¹⁴ the calcium requirements of man for the maintenance of normal equilibrium is 0.45 gram per day per 70 kilograms of body weight. Dietary studies¹⁵ of American families have shown that the calcium content of the diet frequently falls below this figure. A liberal use of milk in bread formulas would tend towards increasing the calcium content of the average dietary, though it may be observed in this connection that the amount of calcium in white bread is not as low as it is generally supposed to be because of the wide spread use of a yeast food which contains this element in liberal proportions. Milk is deficient in iron and adds so little of this element as to have no nutritive significance in milk bread.

Milk Constituents

Van Slyke and Bosworth¹⁶ give the following table which shows the form in which the constituents of milk are combined:

Fat	3.90 %
Lactose	4.90
Proteins combined with calcium ..	3.20
Dicalcium phosphate	0.175
Calcium chloride	0.119
Monomagnesium phosphate	0.103
Sodium citrate	0.222
Potassium citrate	0.052
Dipotassium phosphate	0.230
	<hr/>
Total solids	12.901

In recent years the study of the nutritive properties of milk has been greatly stimulated by the discovery and recognition of the previously unknown dietary essentials now termed vitamins. Special reference books and texts on the history and literature of vitamin research are now available: Sherman and Smith,¹⁷ Funk,¹⁸ McCollum,⁸ Ellis and MacCleod,¹⁹ Eddy,²⁰ and others.

Milk contains the vitamins A, B, and C. Vitamin A, or the fat-soluble A of McCollum, is the most conspicuous vitamin found in milk and was first demonstrated in butter fat; McCollum and Davis²¹, Osborne and Mendel.²²

It is fairly stable when exposed to relatively high cooking temperatures in the absence of oxygen and for this reason it appears to resist baking temperature in the interior of the loaf, although quantitative data on the extent of losses incurred in this way have not yet been satisfactorily determined.

According to McCollum, butter fat is the "most important source in the American and European diet of the dietary essential fat soluble A." This vitamin "is not as abundant in any seeds, tubers or roots, as the amount of it contained in butter fat of good quality."

It is essential for growth or normal maintenance and appears to be a protective factor against certain "deficiency diseases" of which xerophthalmia is an example.

There is considerable lack of agreement in the literature on milk as a source of vitamin B. This problem has been studied and reviewed by Osborne and Mendel²³ who were unable to confirm their previous experience that milk was as potent in B as was formerly supposed.

Kennedy and Dutcher²⁴ found, however, that "the presence of vitamins A and B is entirely dependent upon their occurrence in the ration. Stall fed cows will produce a milk rich in vitamin provided their

ration consists of a proper combination of grains and leaf foods. A vitamin-rich milk is not necessarily correlated with access to pasturage." B is the most widely distributed vitamin occurring in natural foods and many economical dietary sources of it are available under ordinary conditions of the food supply.

In the opinion of many authorities B or water-soluble B is similar in properties if not identical with the anti-neuritic vitamin discovered by Funk.²⁵ It is also recognized to be a fact in the promotion of growth.

Ordinary cooking temperatures if not higher than 100° C, have little effect on the stability of B. In baking, B does not appear to be greatly affected, but as in the case of A, quantitative data on this point is not available at present. The presence of alkaline conditions during cooking tends toward a reduction of the potency of this vitamin. In the manufacture of bread raised with yeast there is no danger from this source, although the baking of biscuits with soda introduces conditions favorable to reduction in potency or destruction of this vitamin unless enough acid is present for neutralization of the alkali.

Vitamin C, or water-soluble C, the anti-scorbutic vitamin, is present in milk to some extent, dependent upon the ration of the cow. Milk as a source of C, has little or no significance in relation to the nutritive properties of milk bread.

This vitamin is somewhat sensitive to temperature, especially when conditions are favorable for oxidation. Dutcher, Harshaw and Hall.²⁶

Wheat's Nutritive Properties

Wheat has probably been the subject of more intensive nutritional study by investigators than any other cereal grain. Notable studies have been made by Osborne and Mendel, McCollum, Sherman and their respective associates.

There is considerable confusion and lack of agreement on certain specific points in the literature of this subject, but there appears to be rather general recognition of the fact that wheat, like the other cereal grains so far studied, either alone or in combination with one another, does not suffice for all the nutritive needs of an animal over a considerable period of its life history.

This has led to unjust attacks on wheat and its products as food because of the failure on the part of some to properly appreciate the nutritional truism expressed as follows by McCollum, that "The keynote to the discussion of the individual foods entering into the diet of man is the importance of using proper combination of foods."

(To be Continued)

A New National Move

WHEN the war engaged the time of most Americans, Julius H. Barnes was our National "Boss of Wheat." As president of the United States Grain Corporation he organized America to pour wheat into the allied trenches for the use of our fighting men.

Now he is president of the Chamber of Commerce of the United States and as such is organizing it to work for America on a bigger scale than ever before. His plan is to establish "regional offices," each with decentralized power, in which the vice-president in charge shall exercise authority within his region, similar to that now exercised by the president over the country as a whole.

American Bakers Association has been notified that its secretary and business manager, Dr. H. E. Barnard, is expected to ally himself with the regional division including Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, North Dakota, South Dakota, and Nebraska.

Common Faults in Bread

Most of Them Are Due to Mishandling of Ingredients

By O. W. HALL*

Head of the Baking Laboratory, American Institute of Baking

THE first thing to do when you decide to build is to draw a plan and then select a site. In drawing up the plan it is a good thing to get the opinion of everyone who is interested in the building.

When we decided to build a quality loaf we knew that all the bakers in the country would be very much interested in the result, and so might like to help in drawing the plans. With this end in view we sent out questionnaires to bakers in all parts of the country asking them to give us their idea of the height of perfection in a loaf of bread.

We received answers from more than 100 bakers, and from these answers we proceeded to draw our plans. After we had the plans we looked for a site on which to build. There was only one site available. This site was the bake shops of America. On going out to view it we found that our site had already been occupied.

Somebody had built a loaf of bread upon it. Instead of destroying the building that we found there we decided to remodel it. About the first of last December we commenced active operations in remodeling. In other words we adopted a systematic plan of bread scoring, under which bakers send sample loaves of their bread to the service department regularly, to be scored and criticised, and to receive suggestions for their improvement. The bakers are supplied with special labels, baked on the bottom of the loaves, so as to insure getting the regular run of bread and not selected loaves. Up to the present time

we have supplied about ninety bakers with cartons and labels to be used in sending in their bread samples.

These bakers are located in all parts of the United States, and we have one in Halifax, N. S. The sample loaves are sent in by the bakers at intervals varying from every day to once a month.

I am going to tell you a few things that seem to be common practices among bakers, and that are responsible for most of the poor quality bread that is being sold. To start at the beginning of a loaf of bread we find that some bakers experience considerable difficulty in selecting their flour. Now with so many cereal chemists supervising the milling of so many high grades of flour, it ought not to be hard for every baker to get a flour that exactly suits his needs.

One of the most common faults I find with the average baker's selection of flours, is that he selects too many of them, and then does something that he calls "blending." This consists of putting two or more flours into a mixer and running the machine a few minutes before adding water and other ingredients. I have also known the so-called blending to be done by putting the water and other ingredients into the mixer first, starting the machine, and then dumping the various kinds of flour in separately.

I should say that in this case the water, salt, sugar, yeast, and anything else used besides flour, would be well blended, and yet I have seen bread made this way that had a DIFFERENT KIND OF GRAIN AND COLOR FOR EACH FLOUR USED, including the dusting flour.

There was one baker who sent in some loaves asking for help to eliminate a bad

*In an address before the American Association of Cereal Chemists at the American Institute of Baking, June 7.

streak through the crumb. After examining the bread I asked him to send me samples of the flour he was using. In due time I received four samples of flour from him with information as to the way he was blending them.

I found that three of these flours were so nearly alike that they could be put together in any proportions, and a good loaf could be made with them. The fourth one, however, was very much darker in color and was also so musty that the gluten was nearly destroyed. It was a weak, worthless flour. I see no objection to the blending of flours if a baker is equipped to do it properly and knows how to select the right flours to blend, but if he is not so equipped he will do much better to use one flour at a time.

The amount of water or the absorption to be used in making up doughs, is another source of trouble to a great many bakers. The majority of flours on the market at the present time require 59 or 60 per cent water to make a dough of the proper consistency, but I know of bakers who are using these flours with 51 and 52 per cent of water. The result is a very tight dough that ferments slowly, does not handle well, and makes a poorly formed loaf. The grain is coarse and uneven with thick cell walls and a harsh texture.

On the other hand there are some bakers who use these same flours and put in as high as 65 per cent of water. Now I am not referring to the large shops with high-speed mixers and other equipment for hand-

ling very soft dough, but rather to the small baker who has a slow-speed mixer and does not use any of the products intended to increase absorption.

The main idea in using so much water is, of course, to get more loaves per barrel of flour, and these bakers think they are really doing it. I believe that if they would keep an accurate record of the amount of dusting flour used they would find that their final absorption is just about normal, while the number of loaves obtained is about what would be expected from the total amount of flour used.

Besides deceiving themselves about their yield, such bakers generally find that their bread is not quite as good as they would like to make. Bread made in this way has hard lumps of raw flour scattered through the crumb. There are also dark streaks of dusting flour which will show you just exactly how the loaf was moulded.

These faults are also accompanied by a flavor of raw, unfermented flour.

There is one other bread ingredient that I am going to mention, and that is yeast food. There is no doubt about the beneficial effects of yeast foods if they are properly used, and I don't suppose any baker ever bought any of these products without being told how to use them. Still there are plenty of bakers using yeast foods together with the usual amount of yeast, mixing their doughs at temperatures anywhere from 80° to 84°, and allowing from two to three hours for the first four punches, and

The Shop Thermometer

Why It Is Important Tool

For a year O. W. Hall has worked in the Service Laboratory of the American Institute of Baking to build up an American Quality Loaf of bread. He has advised hundreds of bakers so effectively that where they once made poor bread they now make excellent bread. In summarizing his work in an address before the American Association of Cereal Chemists Mr. Hall told why some bread is poor and why the thermometer helps in every baking problem. If you have ever faced a dough problem you will want to read his views as here presented.

giving two or three more punches with corresponding times for each. The result is, of course, a very old dough, and bread that crumbles upon the slightest touch.

There are also some bakers who miss the idea of yeast foods so far as to run long-time sponges with a comparatively large amount of yeast, and then put their yeast food in the dough after the fermentation is practically finished. I have been told by bakers who do this that the object of the yeast food in the dough is to get a good oven spring. If they would put it in the sponge it would help their fermentation and still be present to give a good oven spring.

The two factors that are probably responsible for the greater part of the poor bread are time and temperature. There are many bakeries that have absolutely no temperature control. The temperature of their doughs varies with the weather. I have had bakers tell me that their dough temperature varies from 75° to 85°, and the doughs are punched and taken on a set time schedule. The result of this practice is as many different qualities of bread as there are different temperatures, and most of these qualities are poor.

Probably the most common fault in the matter of temperature is mixing doughs too warm. There is a certain coarse grain and dark color which nearly always results from a warm dough. There is one baker who sends in bread regularly, that had this combination of grain and color. I told him that he ought to mix his doughs cooler. He replied that he had been mixing at 82° but had changed to 80°. His bread still seemed to be made from a warm dough so I asked him to send his thermometer in to be checked up. He did so. Mr. Landstrom of our staff found that it was several degrees off, and told him to apply the necessary corrections.

In less than a week after this I received a letter from the baker in which he said that his bread was much better. And yet when

I received his next sample of bread I found that he had made no change in his time after reducing his temperature, and that his dough was young.

It is very common to find bakers who do not properly divide their time. For instance, I had a formula a few days ago from a baker in one of the Southern states. His formula was well balanced and contained yeast food, but he was allowing his dough three hours for the first punch and 30 minutes for the second and sending it down in 15 minutes. This division of time would be almost certain to result in a very old or a very young dough, because if the dough required three hours for the first punch the remaining time was not nearly enough. On the other hand if three hours was too long for the first punch it was too old then and would be too old all the way.

In this case the answer was very clear: the bread showed plainly that the dough was too old. Other bakers will give the dough the first punch in one hour and then allow two or three hours for the second. There should be some definite relation between the times of the various punches.

There are two things that I would like to impress upon every baker. One is that he ought to have some kind of twenty-four inch gauge, by which to properly divide his time, and the other is that the principal working tool of a baker is the thermometer.

Waxide Watchfulness

ENCLOSED please find check for one membership. I am always watching for chances to promote association among bakers, as part of the work of the Allied Trades. The baker who signed this application has a son running the Raton Bakery in Raton, N. M. Maybe you can get him to sign up, too, if he knows about his dad.

EUGENE B. STANLEY,
The Waxide Paper Co., Kansas City, Mo.

An Outbreak of Moldy Bread

An Examination Revealed an Unusual Survival of Spores in Baking

By WILLIAM C. FRAZIER

Department of Agricultural Bacteriology, University of Wisconsin

ALMOST any loaf of bread, if kept in a warm, moist place, as in a bread box, will mold. A variety of green, yellow, black and sometimes red molds will begin to grow on the sides, ends or bottom of the loaf. This mold growth is comparatively slow. It generally does not appear until several days after the loaf is baked; and the mycelia penetrate the interior of the loaf slowly. This type of molding might be classed as one of the normal changes in bread, much as souring is a normal change in milk. It is practically impossible with ordinary methods to avoid the contamination of the surface of the loaf with a few mold spores. The amount of this contamination will vary considerably with the methods used in the bakery. Strieder and McClellan have shown how this surface contamination can be made very light. They have also pointed out how the mold does not appear for several days after the loaf is baked. This type of molding should not be especially troublesome, then, to the baker. A reasonable amount of care in the sanitation and cleanliness of the bakery should effectively limit this source of trouble. A type of molding that will appear on the bread several days after it has reached the customer will not be the cause of much trouble or complaint.

The trouble at the bakery in which the epidemic to be described occurred, differed from the ordinary molding of bread in several ways. Most striking was the rapidity with which the mold appeared and penetrated the loaf. The mold apparently started to grow very shortly after the loaf

left the oven and grew so rapidly that within a few hours the bread was unfit for use. A second important difference was that the growth practically always started in the crease of the loaf near the "under crust" and generally below the surface. A third point was that the growth was not limited to near the surface but penetrated the loaf rapidly. And lastly, only the bread which was wrapped in wax paper gave trouble.

Bakery Conditions

At two different times a thorough inspection of the bakery showed that there was no source for gross contamination in any of the machinery or equipment of the plant. All of the rooms were clean, and all had been freshly whitewashed except a small portion of the basement where the flour was stored. A systematic examination of the machinery, following the course of a loaf of bread in the making until it was wrapped for delivery, showed all the equipment to be in a sanitary condition. All of the parts except the flour chutes and oven were thoroughly washed after each batch. The pans were being washed in disinfectant during the later part of the trouble, and both cooling and wrapping rooms were scrubbed daily. The mixing room, with its flour chutes, was entirely separate from the cooling and wrapping rooms. The cooling and wrapping rooms were clean and were equipped with large suction fans. The wrapping was done by hand in an adjacent room. The loaves were not touched in wrapping. The basement where the flour was stored was clean, airy and not damp. The bags of flour were kept off the cement floor by wooden strips.

Of the ingredients the sugar, yeast and

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water were apparently all right. The flour used did not appear or smell moldy. Two kinds of flour were being mixed in making the bread, one a green flour, the other older. This baking company was the only one in town using the green flour.

Condition of Flour

At the time the trouble was at its worst four samples of the green flour and one of the old flour were examined for molds. Three of the green flour samples showed 50 to 100 molds per gram, but the fourth sample gave a count of 11,000 molds per gram with at least three different genera present. The old flour showed only an occasional mold. At a later date, when the trouble had disappeared 35 samples of green flour, four of old flour and five of pastry flour were plated. Only one sample of the green flour was heavily contaminated with about 1,700 molds per gram. All of the other samples contained only a few mold spores.

Certain lots of green flour, then, were heavily contaminated with mold spores and might serve as source of contamination of the loaf. There are two chief ways in which this contamination might take place; flour dust might fall on the loaf before it was wrapped, or mold spores might survive the baking process and germinate after the bread had left the oven. Gross contamination by flour dust did not seem possible under the conditions in either cooling or wrapping rooms. If a few mold spores did reach the surface of the loaf, they would be more likely to land on the sides or ends of the loaf than up in the crease, which is protected from the dust.

It is a common belief that no mold spores can survive the baking temperature of a loaf of bread. The maximum temperature of the interior of the loaf was found to be 97° C. Strieder and McClellan¹ found the same maximum temperature in their work.

There has not been very much work done on the resistance of mold spores to heat, and the tests have been mostly with moist heat. Thom and Ayers² experimented with both dry and moist heat and found that the resistance of mold spores was much greater with dry heat. They found that many forms of *Penicillium*, *Aspergillus* and *Mucor* withstood heating in dry air at 93.3° C. A temperature of 121.1° C. for thirty minutes did not kill all *Aspergillus* or *Mucor* spores.

Where Mold Started

As has been stated, practically all of the mold growth started at the side of the loaf in the crease made by the edge of the pan. This portion of the bread was more tightly packed than the rest, and was underbaked, *i. e.*, doughy, in every loaf that became moldy. An attempt was made to ascertain the reason for this underbaked portion but neither the reference books consulted nor the Home Economics bread experts gave any reason. A possible theory is that this particular portion at the crease was right next to the heavy rim of the pan where it was heated through and dried out quickly. The fact that the dough was more closely packed at this point enabled it to heat through more quickly. Then, in the absence of water, the baking would not take place. The head baker said that this underbaked portion could not be baked any better, although all of the bread was baked with a harder crust after this trouble had begun.

This underbaked portion, then, was the starting place for the growth of the mold. In order for the mold growth to be evident by afternoon of the same day, the spores must have germinated very soon after the loaf left the oven. After the loaf leaves the oven and is being cooled, the underbaked part takes up water again from the rest of the loaf. Now there are ideal conditions for germination of the mold spore: moisture, warmth, and food. The loaf is wrapped in

wax paper which keeps up the total moisture, keeps the surface from drying out, and causes the bread to heat and hence maintain a better temperature.

Proof that the wrappers were not the source of heavy contamination was given by the fact that molds would grow similarly if the loaf was placed in an air-tight box instead of being wrapped. The trouble with moldy bread was somewhat sporadic. If the flour were the source of the mold contamination this would be expected, for only part of the flour gave a high mold count. The question might be raised in this connection as to why there is not more of this trouble, since undoubtedly all flour contains at least a few molds.

Certain species or even strains of molds are much more resistant to heat than others. The occurrence of an especially resistant species or strain of mold might be the cause of an epidemic. For instance, Thom and Ayers² found that in general the spores of the *Mucors* were much more resistant to heat than the spores of the *Penicillia* and the *Aspergilli*, and that *Aspergillus repens*, *A. flavus*, and *A. fumigatus* had more resistant spores than other *Aspergilli*.

The initial concentration of spores per gram will determine to a great extent the amount of heating necessary to kill all of the spores present. Bigelow and Esty⁸ have shown this to be true with bacterial spores, and this must undoubtedly be true with mold spores. The greater the initial number of spores, then, the greater the resistance to heat. A loaf of bread made from highly contaminated flour will be more likely to contain live mold spores than a loaf made from a flour containing comparatively few molds. The same investigators showed that the rapidity of germination of the spores that survived is a function of the number of spores. The survival of an occasional spore after the loaf is baked would not mean the development of a mold.

The conclusions drawn from the investi-

gation of this trouble with molds are, then, that the original gross contamination of the bread with mold came from moldy flour. Only part of the bags of this green flour were heavily seeded with mold spores and for this reason the appearance of moldy bread was sporadic. Some of these mold spores lived through the baking process in the underbaked, closely packed portion of the loaf in the crease at the top of the pans. These mold spores began to germinate while the bread was cooling. The bread was wrapped in wax paper, which kept the bread moist and kept up the temperature of the loaf. Under these favorable conditions of incubation, the molds developed rapidly, so that by afternoon the bread was spoiled.

The remedy suggested was, of course, to stop using the contaminated green flour for making bread that was to be wrapped, and to make mold counts on any new lot of flour received. This advice was followed and no further trouble was reported.

In their book *The Technology of Bread-Making*, Jago and Jago⁴ mention a trouble similar to this in Paris. They say: "Under favorable conditions *Penicillium* develops with extreme rapidity; some few years since the barrack bread at Paris was attacked by this fungus; a few hours were sufficient for its development, and the mold was in active growth almost before the bread was cold. It is stated that spores of this species are capable of withstanding the heat of boiling water, so that the act of baking an infested flour would not necessarily destroy the spores."

In their article on *Mold in Bakeries*, Strieder and McClellan¹ take the stand that the baked loaf is sterile, that infection is never due to ingredients but is due entirely to surface contamination subsequent to baking. They state that the amount of infection is dependent upon the sanitary condition of the bakery. It is interesting to note in this connection that the P— bakery would have practically a perfect score as

scored by their score card. They say that all floors examined showed heavy infection of molds. Their method of examination was to place the flour in sterile Petri dishes, moisten with sterile water and incubate at room temperature. The writer tried this method of examination and discarded it as inaccurate. Plate counts made simultaneously for comparison, showed that samples of flour with only a few mold spores per gram would develop mold growth as quickly and as extensively as a flour containing thousands of spores per gram. It is true that if the moistened flour method alone was used, that most samples of flour would be adjudged heavily infected with molds. In their experiments with flour, Strieder and McClellan showed how resistant mold spores may be to dry heat, when spores of *Penicillium glaucum* survived a temperature of 160-170° C. for an hour and 130-140° C. for 85 minutes.

In experiments on the sterility of the loaf the appearance of molds on plates of crumbs from within the loaf were all laid to *faulty technique*. Experiments to determine the heat resistance of spores of *Rhizopus* were all conducted with moist heat. When *Rhizopus* appeared on plates made from the interior of a loaf which had been previously inoculated with *Rhizopus*, again the technique was blamed. In all of the cases discussed in the paper the mold was not apparent until several days after baking or even longer. This is typical, in general, of the molding due to surface contamination, which type of infection differs from the one under discussion.

In the trouble at this bakery, then, evidence seemed to point towards the survival of mold spores in the baked loaf. The experiments of Dr. Prescott's workers have not established that all mold spores are killed in the baking process. It would seem advisable to have further evidence on this point before definite conclusions could be

drawn, but the results herein noted seem to justify the statement that *under certain conditions* certain resistant mold spores can survive the temperature of baking and germinate and grow in the baked loaf.

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3. Bigelow and Estey. The Thermal Death Point in Relation to Time of Typical Thermophilic Organisms. Jour. of Inf. Dis. 27, 602-617. 1920.
4. Jago and Jago. The Technology of Bread-Making. London. Simpkin, Marshall, Hamilton, Kent & Co., Ltd. 1911.

A Fine New Member

CARL D. WILKE, maker of Sally Ann Bread, in Beatrice, Nebraska, is a type of American baker to whom the future belongs. He has ears that hear and eyes that see and he believes that organization is the only way out for the baking industry. There is much about the American Bakers Association that he does not like. That is why we are glad that he has joined with us. He has sent in his dues; now his suggestions will be more than welcome. One of them is that the National work more closely if possible with state and neighborhood associations. It is a fine idea. We hope it always will be well worked out.

The Kreis-Aragon Test

I AM truly thankful for the information regarding the Kreis-Aragon test for acidity. This is just what I was looking for and it will be of great value to me.

It is indeed fortunate that we have such an institution as the American Institute of Baking to look to for information along special lines. I hope that sometime in the future I may be able to reciprocate in some way.

L. H. McCCLAREN, Pillsbury Flour Mills,
Minneapolis, Minn.

Keeping Out the Rodents

In the Summer Time, Especially, They Seek Refuge in Buildings

By WILLIAM C. WITTE, M. D.

Former Surgeon, U. S. Public Health Service

RODENTS comprise more than one-third of all living species of mammals and exceed any other mammalian order in the number of individuals. In summer, especially, they seek refuge in all human habitations, including bakeries.

Four types of rodents are of special interest to bakers, namely, the common house mouse, the English black rat, the roof rat and the brown rat. The mouse differs from the other three mainly in size; the black rat and roof rat differ from each other mainly in color of fur; and the brown rat is larger and more ferocious, and differs in habits in that it burrows, and in physical characteristics in that its tail is shorter than its body.

Rats are very prolific, producing three to five litters a year, each containing six to nine young. They are found in city and country, in fact in any place where food can be found. They are great travelers and history contains reference to many almost unbelievable migrations of vast armies of rats, due no doubt to food scarcity.

Rats are practically omnivorous; their bill of fare includes grains and seeds, flour, meal and all food products made from them, plants and vegetables of all kinds, eggs and young poultry, and all dairy products. They are also cannibals. Their habits vary somewhat by species; the roof and black rats are climbers, and the brown rats burrow and live in cellars. They prefer narrow places as highways, it being said that they only travel well when their "whiskers" make contact with wall or floor.

Destroyer of Food

From an economical standpoint we are interested in rat extermination because of

the great destruction of food and property by them. It has been said that they destroy by pollution ten times as much as they eat. It has been estimated that the losses in the United States, due to rat depredations, total over thirty million dollars annually. They are responsible for certain diseases of humans such as plague, trichinosis and other infections.

Because of the economic loss due to rat depredation and their responsibility for certain diseases, we are especially interested in their suppression. Extermination would, of course, be preferable, but it is believed at this time to be almost impossible. They may, however, be driven out and kept out of a limited area such as a bakery, but continued vigilance is necessary, otherwise they may return.

How to Exterminate Them

Much may be said concerning the methods of suppression and many measures may be suggested, but the most important and most effective are, (a) rat proof buildings, (b) keeping food from rats.

Rat proofing of buildings means proper construction and knowledge of the habits of rats.

1. Foundation walls should be laid without break and should be at least 18 inches below the surface, and should always be flush with under surface of floor above.

2. Floor joists should be imbedded in this wall.

3. Ground areas should have a layer of concrete 3 inches thick over them.

4. All water and drain pipes should be surrounded with cement where they pierce the walls. Holes may be closed with a mix-

ture of cement, sand and broken glass. In this connection it might be interesting to note that one baker in constructing a new plant secured several wagon loads of broken glass and crockery and dumped them around his foundation.

5. Basement windows should be screened (not less than 20 gauge nor greater than $\frac{1}{2}$ -inch mesh) and doors provided with springs to keep them closed. All openings around skylights, water, sewer, gas or steam pipes must be closed.

Keeping Food Away

Keeping food from rats means proper disposal of garbage and other waste material and the proper storage of supplies. Well covered garbage cans should be required and the garbage should be frequently removed.

Supplies should be stored so as to preclude the harborage of rats. Storage above the floor and away from walls is advisable and in some instances it is even necessary to protect supplies by wire cages. It should be remembered that well fed rats mature quickly, breed often and have large litters.

Other suppression measures are traps, natural enemies, poisons, fumigation and domestic animals, all of which are valuable aids and if necessary should be brought into play. The ordinary house cat is too well fed and too lazy to undertake the capture of an animal as formidable as the brown rat. Indeed, there is no need for harboring a cat in a bakery. Its presence is usually evidence of conditions which are not desirable. For this reason the Sanitary Code excludes cats from bakeries.

Child Welfare—and Bakers

IN THE January issue of *The American Food Journal* was told the story of the amalgamation by Mr. Hoover of all the leading child welfare organizations into the present American Child Health Association.

Today Secretary Hoover is addressing at least one of the great food trades, asking: "What is your branch of the food industry doing to further the feeding of America's undernourished children, those children on whose shoulders rests the future of the Republic?"

What is the answer?

Ask a baker and he will reply: "we are making possible the 'super-loaf'; we are stressing the necessity for scientific research in nutrition; we are conducting careful experiments with yeast and its place in the diet; we are taking care to add a generous supply of milk to our dough; we are advocating the reasonable use of bran and whole grains."

Ask a packer and hear:

"We have organized a great 'Institute' for the purpose of setting in motion machinery that shall enlighten the citizens of America as to the place of meats in the diet."

From a fruit grower:

"We are, by means of scientific advertising copy, spreading the knowledge of the vitamins and mineral content of fruits."

It is customary to think of the business world as a place of practical methods where the dreamer of dreams must first "deliver the goods," if he is to have even casual listeners.

As a matter of fact the man of successful action must have about him a capacity for envisaging the results of his own work.

May not one dream of the time when there will be something akin to a "Food Manufacturers Institute of Nutrition," wherein the results of research and activity from all divisions of the field may be pooled, and from which each manufacturer may go forth to improve his product, minimize his overhead and nourish the community in which he dwells?

But we must "dream true!"

—From the *American Food Journal* for May.

Books for the Baking Laboratory

FOOD, HEALTH AND GROWTH. L. Emmett Holt, M. D. The Macmillan Company, 1922. 273 pp. Price \$1.50.

Under the title, Food, Health and Growth, Dr. Holt has brought together a series of lectures given at the Medical School of Stanford University.

The facts behind nutrition, and especially the nutrition of children, are handled in such a manner that they are readily grasped by the general reader.

The author points out that health and normal nutrition are so closely allied that one may be taken as an index of the other. While there may be normal nutrition with health, there cannot be health without normal nutrition.

The draft which combed from out a heterogeneous population over 4,000,000 young men fit for military service was the first health inventory ever made of the nation's most valuable asset. The showing was appalling. Around 30 per cent of our young men were rejected as physically unfit for service. Many of the rejections were due to faulty nutritional habits in infancy and youth.

No industry could survive if 30 per cent of its output was unfit. Ayers, an investigator for the Russell Sage Foundation, has found that some six millions of children in the United States, 16 per cent of all children of school age, are retarded in school work, or below the grade for age. The cost of the cities alone of educating this retarded group is estimated to be \$27,000,000 a year.

Dr. Holt, from his long experiences as our leading specialist in infant feeding, and as president of the Child Health Organization, is able to point out how children may be better fed, and so how child production, our most important industry, may eventually be based upon an efficiency basis. Every student of nutrition, and particularly every baker who realizes the rôle his industry plays in the proper nutrition of the child, will want to read this excellent book.

He will want to read it not only for his general education but to prepare himself to meet the growing demand that nutritional quality in bread be given greater and greater consideration.

H. E. B.

THE PRACTICAL COOK BOOK. By Bertha E. L. Stockbridge. D. Appleton & Co., 1922. 493 pp. Price \$2.00.

Mrs. Stockbridge calls her book "A Guide to Economical Good Living," and a perusal of its

pages convinces one of the truth of her claim. The directions are given in a plain concise manner, and the combinations of materials are such that they may be used to advantage by the average American family of moderate means. There are many recipes for baking bread, white, brown rye, as well as breads in which part of the wheat flour is substituted by corn meal bran, oatmeal, rice or potato. Naturally pies, cakes and desserts receive their share of attention. A large number of interesting meat recipes are given.

The "Eat More Wheat" campaign is well served, though at the time the book was written Mrs. Stockbridge had never heard of it, and the man or woman most jealous of retaining a slender waist-line could be persuaded to "Do It with Bread" by "eating one more slice per meal a day," if tempted with a judicious selection from the list of 80 sandwiches given on pp. 349 to 353.

In the collection of menus, grouped on the three meal a day basis for thirty days, hardly a breakfast is mentioned which does not include **TOAST IN SOME FORM OR OTHER**, hence the "Toast for Breakfast" campaign, which the bakers are now entering upon, is quite thoroughly supported. For bakers desiring to advertise attractive sandwich and toast combinations the book is especially recommended as a valuable source of data.

R. E. P.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Crude-fiber Determinations. S. J. Lawellin. J. Am. Assoc. Cereal Chemists 7, 208-13 (1922).—Comparison is made of the single and double filtration methods of determining crude fibre both with and without the removal of the fat and also the single filtration method as modified by the Am. Assoc. Cereal Chemists. The methods were tried out on 14 samples so chosen as to cover nearly all crude fiber analyses met with in an industrial cereal laboratory. A table gives results. The single filtration method as modified by the Amer. Assoc. Cereal Chemists, is fully as reliable as the method of the Assoc. of Official Agr. Chemists. Weigh two grams finely reduced material, extract 16 hours with Et_2O in a Soxhlet apparatus. Transfer fat free material to a 1 flask (Erlenmeyer).

boil exactly 30 minutes with 200 cc. 1.25% H_2SO_4 , then without filtering add 200 cc. 3.52% $NaOH$ and boil exactly 30 minutes. Remove the sample from the fire, add excess of concentrated HCl (d. l. 18) by pouring cautiously down the sides of the flask. Excess of acid is indicated by change of color and breaking up of colloids. Filter through an alundum crucible of maximum porosity, wash with water until free from acid, then with alcohol and Et_2O . Dry, weigh, incinerate, and weigh again.

RUTH BUCHANAN.

Types of Crude Fiber. A New Method for the Determination and Identification of Flour in Foods. A. Fornet. Chem.-Ztg. 46, 969-70; Z. ges. Getreidew. 14, 58-61 (1922).—The amount of flour in food is estimated by preparation of its crude fiber and microscopical comparison with crude fiber from a known amount of the same kind of flour; the kind of flour is determined by comparison of color of crude fiber with that from known sources.

HARRY J. DEUEL, JR.

Chemical Test or Heat Damage in Wheat. W. L. Frank. J. Am. Assoc. Cereal Chem. 7, 218 (1922).—The test consists in making a tiny "dough" out of $\frac{1}{2}$ milligram flour on a glass slide by the addition of a drop of eosin solution (0.2 gram H_2O solution eosin in 1,000 cc. H_2O) and gently rubbing or mixing the flour and liquid with a second piece of glass. Note the formation of carmine-colored "gluten rools" due to absorption of the eosin by the gluten if the kernel is sound, and the specked appearance of the "mealy" dough (devoid of gluten rools) when made from a heat-damaged kernel.

RUTH BUCHANAN.

Some Factors Influencing the Determination of Moisture in Flour. L. E. Leatherock. J. Am. Assoc. Cereal Chem. 7, 102-7 (1922).—The moisture results of 69 laboratories on the same sample of flour are shown. The average of 69 results was 14.19%, the minimum 13.22%, the maximum 15%. The average of all air ovens was 14.15%, ranging from 13.22 to 15%. The average of all vacuum ovens was 14.45%, ranging from 14.15 to 14.74%. Experiments which bring out forcibly the factors that will cause a variation in the amount of moisture lead to the following conclusions: (1) Samples for collaboration should be sent out in air-tight containers; containers should be insulated against heat whenever possible. Determinations should be made at once after

receiving sample. (2) Laboratories using air ovens and vacuum ovens cannot check against one another; the vacuum oven gives the higher results. (3) Grab samples should be used instead of a definite amount. That is, the empty container is weighed, the approximate amount of sample desired dumped in, the cover replaced, and the gross weight obtained in preference to balancing the weights by putting the flour in the container while the same is on the balance pan. (4) In the use of air ovens the approximate weight of the sample should be standardized. (5) In the use of air ovens, the temperature and time of drying should be standardized within close limits. Temperature range should not be over 2° and the time should be adhered to closely.

RUTH BUCHANAN.

Flour Bleaching Reagents. J. C. Baker. J. Am. Assoc. Cereal Chem. 7, 108-11 (1922).—A short history of the bleaching of flour is given. The details of bleaching by the Agene process are discussed. Several reasons for bleaching flour are mentioned.

RUTH BUCHANAN.

Flour Strength. H. A. Weaver and W. A. Goldtrap. J. Am. Assoc. Cereal Chem. 7, 115-23 (1922).—A resume of the various factors that influence the strength of flours. Experimental results are given of a complete analysis and a series of baking tests for the patents, straights, and clear flours from a hard winter wheat, a soft winter wheat, and a hard spring wheat patent.

RUTH BUCHANAN.

Relation Between the Nutritive Values of Bread and Macaroni, and the Restorative Value of Certain Fresh Vegetables. G. Petragnani. Rend. d. adunanza d. accad. med.-fis. fiorentina; Sperimentale 76, 247-55 (1922). Pigeons placed on an incomplete diet show a greater resistance to its effects if they have at some previous time been on a more completely devitaminized diet for a long period. The ordinary medium-grade flour from which bread and macaroni are made has been deprived of about two-thirds of its vitamins. Boiling for 10 min. in salt H_2O caused a further diminution. Bread showed a higher nutritive capacity than the flour from which it was made, owing to the raising process. Vegetables and fruits are classed in the following decreasing order of protective value: peas, cabbage, lettuce, radishes, pears and plums.

M. H.

Moist Spring Brings Woe

IN MOST of the loaves of bread now coming to the American Institute for regular study, cases of rope infection are beginning to appear. In every case of rope the bread is found to be from a moist, warm section of the country. A hot summer, leaping full-bloom almost from the lap of winter, means a summer unusually full of bakers' troubles.

To each of the bakers whose loaves showed traces of rope, O. W. Hall, chief of our baking laboratory, telegraphed this hot-weather caution: "Develop your doughs a little longer. Clean up all waste flour. Never let stale loaves come back into the bakery. Remember that acidity in the dough is the foe of rope bacteria, and that most rope cases come from young doughs, underbaked."

The advice, according to Mr. Hall, cannot be repeated too often during the next three months as the nation as a whole has seldom experienced so moist and warm a summer-time.

A southern baking company demonstrated that it could catch the spirit of the way to control rope, as developed through recent research. "We are sorry to hear that our last shipment of loaves to you arrived quite moldy," this company wrote in. "I hope these loaves were delayed longer than usual in the parcel post service; I know that we are very careful about the disposition of stale bread, old flour and other such material around the bread plant. However, in view of your advice, we are doubling our precautions. We have to thank you for this advice; it shows the help the American Institute can give the baker and perhaps you have saved us from an epidemic of mold and possibly rope.

"I am sending you today, via express,

four loaves of bread. Kindly score and advise if they show the effects of increased fermentation and proper baking out. We are pleased with the service from the Institute and are today advising our millers to send samples of the other brands we are purchasing from them to your Institute for analysis."

This letter from a southern baker is only a sample of hundreds received. What he has found out, any baker in America can find out by showing an alert interest in the Institute's scoring service. This service was inaugurated as a gesture in the direction of making the **QUALITY LOAF THE ONLY LOAF THE AMERICAN CONSUMER HAS TO MEET.**

Do you notice that you can't buy a bad orange or a bad California walnut or a bad Petaluma egg any more? They found that **QUALITY** goods begot confidence and confidence begot resales. There are lots of loose-skinned oranges. Recently the writer encountered trucks unloading such oranges at an orange-drink fountain. They had all been culled out and kept away from public contact. And so bad bakery goods similarly can be "culled out," not by segregation, but by ceasing to produce them.

That is why the **QUALITY LOAF** is the Institute's ideal loaf and why every effort is being made to get it into production **EVERYWHERE.**

New Punching Method

Here is another example of service well received. It is from the Koeniger Baking Co., of Kingsport, Tenn. "Since using your method of punching our doughs," they write, "we have noted a big improvement in our bread; that is, we think so."

Do these letters interest you? The service is here for you from your own Association if you want it.

BAKING TECHNOLOGY

*A Journal of
Applied Science
in Baking*



*Published by
The American Institute
of Baking*

VOL. II

CHICAGO, ILLINOIS, JULY 15, 1923

No. 7

Long Pull Ahead for Wheat

NOW that the organized business life of America is represented practically in its entirety, by fifteen members of the board of directors of the newly organized Wheat Council of the United States, members of the baking industry have work to do, in an organized way, with a group of allies such as never before was joined with them. What are the bakers going to do with their new-found opportunity? Alexander Taggart and William Deininger are

the two spokesmen for the baking industry sitting on the board of directors of the Wheat Council of the United States. Their object—the object of one and all on

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the council—is to put more wheat into consumption in America and so bring to America itself a control over the market price of wheat.

Are you, Mr. Baker, coming to French Lick, to hear this whole problem talked over and to gain the vision, at your national convention, of those who have worked with the problem for months and years, and who know how you stand, as an individual baker, in the

picture as seen in its national perspective?

Never was such an important convention as that which will be held in the week of September 10 at French Lick Springs. All playing aside—and playing together is

more important than working together at the present stage of development in our organizing industry—there are things to be talked over at French Lick that all bakers must understand before co-operative work can ever progress materially towards its potential possibilities.

Between now and September the Wheat Council of the United States will be doing its work here in Chicago and bakers will either rise to take advantage of it, and of their opportunity to co-operate with it, or they will remain self-centered and let its great messages ride past. It really seems that here is an opportunity such as the Bible speaks of—where he who would save his money by tight, close, self-centered watchfulness of it, will lose it, while he who spends both time and energy coming to join with his fellows in the tasks ahead of our industry at this time, will have his investment returned to him several fold.

A Long Drive Is On

In this business of restoring wheat to its former place in the diet a long drive is now on. It isn't a drive of weeks, or months. It is a drive of five years at least, and men like James F. Bell, Sydney Anderson, A. C. Loring, George C. Jewett, Alexander Legge, O. E. Bradfute, and the host of those working with them, will make it so.

Their coming together in the way they did, with John Hartley, who boasted that he was "a one horse baker," seated at the dais between Charles H. Markham, president of the Illinois Central Railroad, and F. Edson White, president of Armour & Co., meant that the business leaders of America realized the time had come to have a wheat program in America. It meant that these men realized there was folly in government price-fixing, now as always, and folly in calling for special government action when ECONOMIC action was what was really needed.

When these men, one and all, with their

backers and associates, stated that the work of the world war, which reduced wheat food consumption in America by 200,000,000 bushel per year, gave our force of civilization and economic leadership a task of restoring wheat consumption to its pre-war normal, they spoke for a cause every baker must study.

Every baker has a role to play in the new drama, of course. Mr. White, speaking for the meat industry, had his cure in FEED MORE WHEAT, as a means of getting rid of low grade wheat and leaving the good wheat only to make the market. He saw better hogs, better beeves from a wheaten diet.

Taggart as Spokesman

But then came Alexander Taggart with the message of the bakers. He saw the bakers as the sales army of the farm world. He saw ahead to a day when better pastries, better bread, better pie should force MORE WHEAT INTO USE—by the compelling power of appetite and eye appeal.

He had a history behind him when he spoke of having won a signal victory in his own town for quality bread—a victory over extremely low-priced bread that had been offered to the grocers at half his price. The grocers had found the people would not buy it more than a few times and asked pointblank for Taggart's—and Taggart's was a quality loaf with all the good ingredients in it it was possible to pack into a loaf. Starting even with the competitor who had gone down to nearly half his price, a year of selling at nearly double this competitor's price had resulted in his selling five loaves to the competitor's one, as the writer learned on the ground from entirely disinterested, but highly authoritative sources.

What is the work that is to be done together? First of all there is that weak spot in the daily dietary—the hurry-up breakfast of the busy man—to aim at. Toast at 10 cents a pound, if it can be really made appetizing and delicious—toast with a cup

of hot coffee and a spreading of butter, jam, or cheese—will appeal to him. It will replace 50-cents-a-pound food of much less nutritive value, most of which came on in the war period when wheat was forced off the breakfast table as a war service.

Toast at Breakfast

The work for greater wheat consumption in the form of toast has possibilities such as the orange growers realized when they invented machines to squeeze oranges almost instantaneously. They put these machines into action in soda fountains and killed the business in synthetic orange juice. Synthetic juice had always been used where too much time was necessary to prepare a fountain drink from real oranges. They increased the sale of oranges by thousands of tons per year.

The electric toasters which will make it possible for folks in every American wired home are now perfected through research at the American Institute, and plans for consolidating the power of the bakers of America in putting these toasters into every wired home will be brought to French Lick. Co-operation of the electric current men and the electric manufacturers on a magnificent scale will push this campaign over, once the bakers realize its drive and direction.

And back of it will stand the Wheat Council, whose members will see that the farmers comprehend how this movement interests them.

Of all who witnessed the two days of debate in the national wheat conference, William Hard was probably the most seasoned writer of national recognition and fame.

William Hard's View

He wrote in the magazine *The Nation* his own story of the Wheat Conference. It was a story of members of the baking industry "WHO USED TO BE MERE RULE-OF-THUMB BUSINESS MEN BUT ARE NOW ON THEIR WAY TO BEING SCIENTISTS."

With the bakers, under the leadership of Dr. H. E. Barnard, he wrote of Mr. Jewett, "co-operative seller of some 35,000,000 bushels of wheat from the Rocky Mountains," and Ben Marsh, "pallid and untiring scourge of railroad managers, packers, millers, and middlemen."

William Hard had long known the radical cure-alls for our economic ills. Now he found himself in the position of learning that conservative forces had a program.

"Explaining the farmer's leanness," he wrote "there came to this conference one who is half of him the world's supreme warehouse of food facts and the other half of him the only known equivalent of Albert Lasker and Herbert Bayard Swope put together in number of dynamic mental throbs per minute. This man is Alonzo Taylor, former chief food expert for Herbert Hoover in the United States Food Administration and now chief manager of the Food Research Institute of Leland Stanford University.

Alonzo Taylor

"Dr. Taylor tore all the sweet disguising veils away from the homely, rough fact that the American wheat farmer is now growing a great deal more surplus wheat than Europe, by any device of advanced credits or of settled reparations or of funded debts, can possibly be induced to take.

"HE DISPELLED TOTALLY THE IDEA OF A RECONSTRUCTED EUROPE AS THE CONSUMER OF THE SURPLUS WHEAT GROWN ON OUR RECENTLY ENORMOUSLY EXPANDED WHEAT ACREAGE. THE CONFERENCE DID NOT SEEM TO THINK IT SEEMLY TO ASK MR. SECRETARY HUGHES TO PLEASE KEEP EUROPE IN A DISORGANIZED CONDITION IN ORDER THAT IT MIGHT BE OBLIGED TO IMPORT MORE AMERICAN WHEAT TO TAKE THE PLACE OF AN EXISTING BUT UNTRANSPORTABLE PRODUCT. IT ACCORDINGLY LET EUROPE ALONE.

"ALL GOVERNMENTAL, ALL POLITICAL, DE-

VICES FOR SOLVING THE WHEAT GROWERS' PRESENT WOES WERE SHATTERED BY DR. TAYLOR. THE AMERICAN WHEAT ACREAGE MUST BE ACCOMMODATED TO AMERICAN NEEDS, WITH NO MORE DEPENDENCE ON EUROPE'S NEEDS AND DEMANDS THAN WAS CUSTOMARY BEFORE THE WAR. Along with this tendency towards contraction, however, there must at the same time be an opposite tendency towards trying to expand the domestic, internal wheat market. Americans are eating less wheat than formerly. THE WHEAT TRADE, AND THE FLOUR TRADE, AND THE BAKING TRADE MUST ENTICE THEM BACK TO THEIR ORIGINAL WHEAT APPETITES. Finally, the wheat farmers must sell more of their wheat through their co-operative associations, which will give that wheat a better grading and which will see to it that only the right grades are offered the public.

A Bakers' Program

"Against international and national political expedients of all sorts, this program now stands out as the one towards which the anti-radical saviors of the basic part of America's basic cereal industry will flock. It means that the conservatives have a program. It means that what with this program and what with the program of the radicals, and what with the competition between them, the radicalism of the wheat farmer will probably within a few years be turned to prosperity. And to conservatism."

William Hard surely saw the issue here, as the important leaders of the movement saw it. It surely means to bakers—they must work together and THERE IS A PROGRAM that they themselves must put across.

The Meat People Busy

WILL the bakers who believe that the cause of the baking industry can be forwarded as an individual problem, each baker working for himself, please note the con-

solidated efforts of the meat forces.

They moved on Washington and obtained, through a central committee, a poster signed by the U. S. Department of Agriculture. It proclaims its cause thus:

MEAT IS
WHOLESOME
FOR HEALTH AND VIGOR
EAT
WELL BALANCED MEALS
USE A VARIETY OF KINDS
AND CUTS OF MEAT
U. S. DEPARTMENT
OF AGRICULTURE

More than that, that the meat folk, functioning through a single spokesman, R. C. Pollock, managing director of the meat board, called attention to meat as food in connection with the menu cards served in a single week to 2,000,000 hotel and dining car patrons.

The poster printed above they obtained permission to display in the dining cars of 51 railroads covering most of the country's mileage.

Bakers who read of this accomplishment are invited to send in their membership applications to A. B. A., if they have not already done so.

Scoring to Advantage

WE ARE forwarding today our leading brands of bread, small and large, for scoring. Please hold these loaves, as our superintendent, Mr. Beck, will be in Chicago about the time they arrive. He would like very much to see you score them and make notes of your criticisms. Our last report we consider very beneficial. The satisfaction of knowing how our bread compares with other bread throughout the country is well worth while, and we intend to ship bread for scoring to you regularly.

J. F. SHIELDS,

The Washington Bakeries, Seattle, Wash.

Planning for French Lick

Leaders of Baking Industry Develop Ways to Make Twenty-Sixth Annual Meeting a Memorable One

THE twenty-sixth annual convention of American Bakers Association offers to every baker, everywhere, whether a member of the Association or not, an opportunity to participate in a program planned with the idea of instructing the baker in the essential features of his industry. The entire week of September 9th-16th will be spent at French Lick, Indiana, one of the most beautiful country resorts in the United States, accessible by rail and auto to a large percentage of bakers, famous for its hospitality and for the opportunities it affords for combining the business of the convention with restful pleasures, invigorating sports and healthful waters.

In arranging the program the committee has endeavored to secure speakers known for their accomplishments in the baking world. The names of nationally known men and women appear because of their knowledge of the bakers' problems rather than because of a desire to lend lustre to the program.

In deciding to present the serious and business features of the week's program in the form of symposiums, it is the thought of the committee that definite hours set apart for definite discussions participated in by many speakers, will be more instructive and of more general interest than a hurried effort to cover the baking field with a few outstanding addresses. Leaders have been chosen for the several symposiums who are acknowledged authorities. The discussants, whose names will not appear on the program, are equally well informed. Their discussions will not be casual, off-hand remarks but the result of their studied effort to give their hearers, in the six minutes

allotted to them, a thorough digest of their particular phase of the topic.

This plan of presenting a convention program is an innovation but it offers unusual opportunities for the condensation of essential facts into brief and pertinent discussions. It also affords the chairman a means of scheduling the program of the day so accurately that every speaker will know when he is to appear and every session will close at the established time with no business or subject unfinished.

Morning For Work

Every morning will be devoted to the real purpose of the convention—the development of a better baking industry—every afternoon and evening will be reserved for recreation in its most acceptable and diversified form. The committee on entertainment, under the leadership of Gov. Alton Hathaway, has prepared a series of "sport programs" which will make every afternoon something to look forward to and a day long to be remembered.

French Lick has two of the best eighteen-hole golf courses in the country. The course known as the "Valley Course" is but a stone's throw from the hotel. A modern golf house provides every need of the golfer. This course is constructed to meet the desires of those who wish an interesting but not too strenuous game of golf.

The new course known as the "Hill Course" was laid out three years ago by one of America's most famous golf architects, and has been under the constant care and watchful eye of expert greenkeepers. Nothing has been overlooked in laying its foundation, and while it is not unduly hilly,

it is of a general rolling nature which at different points give the player a broad and impressive view of the surrounding country.

Bunkers and Fairways

Every scientific method was adopted and applied to make this course a most perfect one. The putting greens and fairways have been scientifically tiled for drainage. Each hole is constructed to arouse and hold the player's interest. Every shot is charged with anticipation. There are hazards to the left, bunkers to the right, and increasing enthusiasm ahead. From the first drive to the last putt, every golf fan will find real golf, real sport and real pleasure.

A new club house complete in every respect, and especially designed to provide for luncheons, dinners and social functions, is located on the grounds. Putting greens and a short course for beginners lie adjacent to the hotel.

Riding and driving are very popular; a large stable is maintained, which contains many excellent saddle and driving horses. Its picturesque and varied character make the country ideal for this form of recreation. There are many miles of firm macadam road, but much of the more beautiful scenery is found on the roads which are traveled best on horseback.

Other popular forms of amusement for which complete facilities are afforded are tennis, bowling, billards and pool, and indoor golf.

The sports program will be complete. Every golfer will have his six afternoons on the courses, every tennis enthusiast can play tennis to his heart's content, amateur and skilled horsemen will have long afternoons for rides among beautiful surroundings.

The Sports Committee

But to give zest to every sport, the Sports Committee has planned a continuing series

of contests and tournaments. The success of the golf tournament is assured by the selection of Lewis F. Bolser as its director; the tennis tournament is in the able hands of Julius Fleischmann; Joe Emly will arrange for the baseball games; Arthur Bamford will stage field days for general athletic contests for men, while Arthur Katzinger will arrange similar events for women. These will combine skill and fun in the fullest measure. Lee Marshall, as chairman of the committee in charge of the women's program, will provide afternoon bridge, five hundred and other entertainment features.

At Marengo Cave

Thursday afternoon is reserved for a trip to the famous Marengo Cave. This cave is one of the most beautiful caves in the country, far surpassing Mammoth Cave in its stalactite formations. The round trip of fifty miles will be made by auto through a most attractive hilly and wooded country along the famed Lost River and through little hamlets of historic note.

Every evening will afford lovers of dancing an opportunity to enjoy the pleasures of the polished floor.

How to Reach French Lick

Two railroads enter French Lick, the Monon from Chicago and through its connections at Indianapolis and Mitchell, all eastern, western and southern territory; and the Southern Railway, which brings visitors from the south and west through the Evansville gateway. Through Pullman service is provided from Chicago, Indianapolis and St. Louis, and all eastern and southern connections are made either through these cities or Cincinnati or Louisville.

Many visitors will drive to French Lick over the wonderful stone roads of Indiana. The Louisville pike will bring Kentucky visitors by a beautiful two hours' run; Ohio

bakers will motor in either through Cincinnati or Indianapolis; Indiana bakers will use the state highways which link every part of the state to French Lick via the Dixie Highway; Chicago motorists will drive down either through Indianapolis or via Danville, Illinois, to Terre Haute, Vincennes and thence to the convention.

Convention Day by Day

SUNDAY, SEPTEMBER 9TH is get-together day, the beginning of a full week of work and play. Bakers taking Saturday night sleepers from Chicago will reach French Lick in time for one of Mr. Taggart's famous breakfasts, and will have a full day for golf. Much of the routine work of registering members and guests will be taken care of on Sunday, thus leaving Monday morning for starting the convention promptly at 10:00 o'clock.

MONDAY, SEPTEMBER 10TH opens the convention. After President Korn brings down his historic gavel in opening what is to be the greatest convention in the history of the baking industry, and Dr. Miller, the Food Commissioner of Indiana, extends his greetings in behalf of the food officials everywhere and the State of Indiana, the first business meeting of American Bakers Association will take up necessary routine matters having to do with the work of 1922-23.

Committee reports, appointment of special committees and the presentation of resolutions will take up the time until 11:00 o'clock when two addresses, general in character, but especially pertinent to the baker, will be given, one on the work which the Food Research Institute of Stanford University is doing in co-operation with the American Institute and the other on "How Millers and Bakers are Working to Increase Consumption of Cereal Products."

At eight o'clock P. M. the board of governors will meet for a short session and on

adjournment the executive committee will meet to consider necessary business matters and to elect new members.

Bread Symposium

TUESDAY, SEPTEMBER 11TH starts off with a symposium on "Bread Production" led by a twenty minute address by R. L. Corby, director of the Research Laboratories of the Fleischmann Yeast Company. This symposium is an effort to bring together in a single hour the important facts relative to bread production, stressing new processes, improved shop practice and those details which make baking a profitable industry.

The discussants, within the few minutes allotted to each of them, will crystallize their ideas into practical and usable form.

The second symposium of the morning will deal with a very important and yet hitherto sadly neglected phase of the industry, namely, the possibility of standardizing machinery and equipment with the elimination of duplication and the saving of labor. The United States Department of Commerce has established a Bureau of Simplified Practice, and the discussion of the morning will be centered around the effort to determine whether or not the baker can advantageously co-operate with the Government in simplifying his work.

At 12:30 P. M. the Secretaries of the State, Group State and Local Associations will meet for luncheon and for a conference at which the subject of organizing an affiliated association with a membership limited to secretaries and executives of bakers' organizations, will be discussed. F. H. Stephens, Secretary of the New York State Bakers Association and of the New York Bakers Club, will act as chairman of the meeting.

Marketing Methods

WEDNESDAY, SEPTEMBER 12TH is set aside for two important symposiums. The first is devoted to the subject of marketing, and

the leader of the discussion is Elmer L. Cline, who is recognized as an authority. The discussants will take up such subjects as house to house sales, how to meet chain store competition, advertising to increase bread consumption vs. advertising to increase bread sales, BREAD AND—co-operative advertising, educating the consumer, etc.

The second symposium will discuss the "Quality Loaf" and the gold medal winner of 1922. Paul H. Helms will give the leading address. Following him several practical bakers, who have achieved a reputation for quality bread, will tell how they put real quality into their loaf. And as a climax of the discussion of bread quality, O. W. Hall, head of the service laboratory of the American Institute of Baking and the expert who has developed bread scoring until it is a fine art, will give a demonstration on the value of "loaf diagnosis" pointing out errors in formulas and methods and suggesting improvements which will make better bread possible.

While no bread contests will be held at French Lick and no prizes awarded, bakers are requested to send in or bring in samples of their bread. These loaves will be marked by number and scored by Mr. Hall both for the help of the bakers who made them and for the benefit of all bakers who are interested in raising the score of bakers' bread from the present low average of 85 to a score of 90 or better, an improvement which will increase bread consumption and put the

finishing touches on the effort to eliminate home baking.

At 11:00 o'clock A. M. the Allied Trades of the Baking Industry meet for their annual convention.

At 12:30 all women members of the convention, including women from the Allied Trades, will meet for luncheon and for the pleasure of listening to an address by Anne L. Pierce, director of the Tribune Institute. Miss Pierce, for many years associated with Dr. H. W. Wiley in the U. S. Bureau of

Chemistry, is one of the leading writers on food and nutrition and her addresses on food broadcasted from the Tribune radio station are eagerly heard by hundreds of women who know how practical and helpful they are. Mrs. W. J. Torrance, president of the Indiana Federation of Women's Clubs and a worker for many years in the field of home economics, will bring to the conference her ideas of baking as a lost art of the modern 1923 variety of home-maker.

Eat More Toast And Then Go Fishing

Alamosa, Colo., is a small town but it contains a big bakery, or at least a bakery run by a man with big ideas. The Alamosa Baking Co., saw the meaning of the formation of the Wheat Council of the United States, and he "hitched right aboard" with an advertisement of great timeliness. He connected it with fishing and broadcasting—two things in the minds of all his townfolk. And he obtained his data from the American Institute—service gladly given in a fine cause. He connected, too, with an electric man, who told how fine toast was for breakfast, electrically cooked.

THURSDAY, SEPTEMBER 13TH, will be devoted to the discussion of the "Eat More Wheat" movement and the opportunity afforded the baker to assist in the campaign by showing consumers how to do it with bread—our best and cheapest food. As a recognition of the great help the Allied Trades have given the baking industry in the promotion of every association activity, the president of the Allied Trades of the Baking Industry will occupy the chair throughout the entire session.

The first symposium on "Eat More Wheat" will be opened by A. L. Taggart, the baker member of the Wheat Council of the United States and Chairman of our Committee on Publicity and Advertising. Following him several speakers, representing millers, bakers and publicity and advertising firms, will show how bakers may profit by participation in the "Eat More Wheat" campaign.

The second symposium will discuss the "Make Toast Your Breakfast Food" campaign under the leadership of John W. Burns, whose original ideas of increasing bread sales through the making of better toast, have been so successfully carried forward by the American Institute of Baking. Dr. L. A. Rumsey, of the Institute staff, who has been in direct charge of the work with toast and toasters, will tell of the progress of the campaign making the use of toast an important contribution to the "Eat More Wheat" campaign. Bakers who have utilized toast and toasters as trade boosters will tell of their success.

A Junior Lunch

At 12:30 all junior bakers—the sons and daughters of bakers—the boys and girls who will, in the years to come, be the leaders of the industry, will meet for lunch and conference. This meeting is planned in the hope that members and visitors will bring the juniors to the convention where they may meet the men who are leaders today and gain inspirations which will be of untold value in shaping their futures.

Wheat Food Interests

FRIDAY, SEPTEMBER 14TH, will be devoted in part to business and in part to a Conference of all Wheat Food Interests.

The business program will include the adoption of resolutions, the election of Governors to serve during 1923-24 and such other business as may properly come before the convention.

The National Conference Committee of the Baking Industry, organized at the 1922 convention, will convene at the adjournment of the business session and the close of the convention. Delegates from all industries having any interest in the production of wheat and flour and its utilization in baking products will participate.

SATURDAY, SEPTEMBER 15TH, will be devoted to the meeting of the National Conference Committee of the Baking Industry and to such other conferences as may be called to perfect plans outlined during the week.

Air and Dirt

HOW MANY of those who read this item know that there is no such thing as a "ray of sunlight," visible to the eye, and that what appears as a ray of sunlight shining through the window, is only proof that the air is full of dust?

You can perform an experiment to prove this to yourself by making a small inclosure with an opening to admit the sun. At first you will see a distinct ray of light. Then, by keeping your inclosure quiet till all the dust settles, your ray of light will disappear and you will never be able to see it again—till you stir up the dust.

Paul Stern has applied this principle in his modern baking plant at Milwaukee with results that may appeal to the whole industry. He *washes* the air that finds its way into his dough batches, and from the washing machine there comes a large bucket full of mud every few days. This is nothing but air-borne dust reduced to mud form. With the air-borne dust is all kinds of bacterial life. No housewife ever thought of taking out the dust of normal air this way in kitchen sanitation. Here is a development through which the baker can go far beyond the housewife, and beyond the hopes, even, of the most advanced of official sanitarians.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

Published by the
AMERICAN INSTITUTE OF BAKING
1135 Fullerton Ave., Chicago

Entered in the post-office at Chicago, Illinois, as second-class matter, under the act of August 24, 1912.

Price, Fifty Cents a Number; Five Dollars a Year.

JUNE 15, 1923

We Work Together

To win through quality production and the utilization of scientific research a welcome for two loaves of wheaten bread for every one that now finds favor.

The Task Ahead

THE baking industry tried, two years ago, to marshal its own forces into some kind of order, and create a general headquarters based upon the scientific work of the American Institute of Baking. The goal of a consolidated industry, speaking through one mouthpiece, effectively, in the world's affairs, seemed then too far ahead for actual attainment. There seemed to be too many elements of friction and conflicting interest.

But two years of hard work by Presidents Korn and Taggart, Dr. H. E. Barnard and the devoted members of the Board of Governors, supported by the hundreds who saw the vision and the need for its fulfillment, has changed all that.

The baking world is now consolidated; frictions have been smoothed out; many have given in in points of pride and personal interest to create a harmonious whole. And suddenly ahead of our industry has loomed the larger whole, even, than our first thrust in organization aimed at.

The farmer has shown that he looks upon the baker as one step in the pathway of wheat from his farm to the consumer's

table. He is holding the baker to account and taking note of all he does; statesmen have shown that they are interested in the baker as a man who can bring more wheat into consumption and so solve a great economic problem. In the formation of the Wheat Council of the United States two men from the baking industry were permitted to seat themselves for continuous, hard work as part of a body of fifteen who will represent the organized genius and zeal of American industry.

Messrs. Taggart and Deininger will do the personal work for the baking industry in the Wheat Council. BUT THEY MUST BE BACKED UP, and the whole industry must know of this council and all its aims and purposes.

That means the whole industry must turn out at French Lick for the most important conferences the baking industry ever held. The week of September 9 is YOUR WEEK—your convention week. If you can't come, be sure to read about it in full. You can't catch step with the great movements to be launched there till you can hear the music of the band that there will be playing a tune of co-operation for you.

The Path Out

IF ANYONE suggested to Samuel Gompers that the way to "eat more wheat in America" would be to throw down the bars at Ellis Island and give us several million more mouths to feed, he would probably start a row with Mr. Gompers. Yet the Ohio Millers Association has members who feel that this is exactly the cure for the wheat situation; that all other "cures" are foolish.

Farmers, on the other hand, think that a government wheat purchase, at a profitable figure on the farm, followed by resale to

the people above this profitable figure, would solve the wheat problem.

And on this point Mr. Gompers spoke to the National Wheat Conference with strength and brilliancy. When all the talking was done at that great conference, three things stood out prominently.

First, it was shown that farmers had something in common to talk over with bakers, mill men, harvester men, transportation men, bankers, and commercial leaders, and that without the interjection of either politics or sectionalism, they could talk these matters over in terms of economies and economies.

Second, it was shown that the bulk of these leaders, including many farmers, were ready and willing to tackle American problems with MADE IN AMERICA policies and were willing, in wheat, to follow the precedent of oranges, raisins, lemons, beans and watermelons—to force an American market into control, regardless of Liverpool and Liverpool's demand for SURPLUS American wheat.

Third, it was shown that the farmer has attracted vast sympathy to his fight for co-operative marketing, and that men of all lines were willing the farmer should get all for his wheat he could get through co-operative control, the feeding of low grades, the adjustment of crop to consumer demand, and farmer-holding until a seasonable market period.

Artists Please Note

HAS the time completely passed when a lay figure, with a square white cap upon its head, can suitably represent the baking industry? We have hardly ever seen a cartoon in which the baker appeared in any other costume. Artists have conventionalized this view of the baker just as they have conventionalized the "statesman" in the form of a tall figure, of lead-

pencil thinness, with a high, stiff hat upon its narrow head.

The conception of the white-capped baker comes from the old hand-craft days. It does not fit the modern business man who manages the modern bread factory under the most approved principles of modern industrial management. The white cap fitted the baker who worried about dough centers and not about plant control and ledgers. The original of the artist's favorite cartoon-type has almost totally disappeared. When will he catch a fresh inspiration, and make his new type to reflect life as it actually is? *Bakers Weekly* has made a splendid start. It pictures a baker as a business man, looking over the literature that enlightens him as to his business relations with the rest of the world. The Washburn-Crosby Co. has also made splendid progress. Its advertisements depict the baker in business garb.

Science at Work

WITH all due respect to the farmers, railroad presidents, senators and governors of states making up the heavy battery of speakers at the Wheat Conference, it must be stated, in fairness to the facts, that the speaker of speakers—the man whose pronouncements dominated the deliberations—was none of these. He was a scientist, who had spent midnight oil collecting data on wheat from every corner of the world. He gave these practical men the facts for which they hungered. Here was science in action. As the maker of the world's first comprehensive wheat survey, Dr. Alonzo E. Taylor was as effective before the Wheat Conference as he was effective in Central Europe when he saved a generation of children by teaching them to eat whole herrings—head and viscera and all in order not to throw away the priceless vitamins when no other source was at hand.



The Truth in Cartoon Form

As patriotic effort, indulged in by editors, home economics teachers, Hoover's Four Minute Men, and mothers, took the "eat out of wheat," to help win the war they left the farmer with an economic fight on his hands against bankruptcy.

His market was left 200,000,000 bushels below the pre-war level. Now some editors see that in fair play they owe it to the farmer to undo their war work. Hence the above cartoon in the *Indianapolis News*. It tells its story clearer than words could do.

Correct Handling of Doughs

Why Much Poor Bread Is Made from Good Material

By O. W. HALL

of the Service Department, American Institute of Baking

WITH many groups besides bakers pushing for the greater use of wheaten foods, the question of whether bakers are putting out the best possible bread comes up for searching inquiry.

Farmers express an opinion on it. So do business men, and it is evident that merchandising principles in our industry are scheduled for a closer scrutiny, both from within and from without, than they have ever before received.

The successful baker finds, suddenly, a new pathway beat to his door by other bakers who wish to find the secret of his success. To the baking laboratory of the American Institute of Baking come, suddenly, more than twice the number of loaves for analysis and scoring, that ever came before.

What is wrong with these loaves? What do they show the average baker needs to do in some different manner?

In a batch arriving, for instance, on the day this is written, many of the loaves were scored very low because lumps and streaks ran through the crumb. The ingredients were of good quality. The flour was excellent. Why had these lumps and streaks appeared?

It was simply that good flour and good ingredients other than flour had been poorly handled. The dough had been allowed to crust over, because of a lack of care in the proofer or on the bench. The dough told its own story—that the atmosphere in the bake shop or in the automatic proofer had been too dry while this dough batch was passing through.

The crust, on top of the dough in the proofer, or on the bench, had been rounded into the loaf form and it appeared in the

baked bread as a series of streaks and lumps.

Tight and Loose Moulding

With the coming of modern machinery new bread ills appear that the old hand-craft workman had solved. Careless handling of the machinery by bakers who are not yet machine experts is responsible for many of these ills. Take the moulder, for instance. Some of the bread arriving here for inspection is moulded so tightly that it never thereafter seems "to get its breath" enough to rise in the oven.

Then again, in other cases, it is moulded so loosely that there are large pockets of gas. These result in large holes in the loaf. THE PROPER ADJUSTMENT OF THE MOULDER WILL GIVE A SYMMETRICAL LOAF WITH A WELL FORMED GRAIN. It is possible to tell from a mere glance at any loaf whether the machinery through which it passed from proofer to pan was properly adjusted and properly handled.

Proper Use of the Pan

At first glance, the business of putting loaves into the pan seems so simple that it would be hard to think of this trick being done so badly as to harm the finished loaf. Yet the loaves sent us show much careless handling here. One loaf we cut open had, for instance, a distorted grain. That condition told its own story as certainly as a moccasined footprint on an Indian trail. THE LOAF HAD NOT BEEN LAID STRAIGHT IN THE PAN. Another loaf showed, without being cut open, that it had not been laid straight in the pan. It lacked symmetry of form.

Sometimes bad handling and bad moulding go together. A two-piece split-top loaf

showed streaks through both halves of it and lacked symmetry of form as well. The cure for the first evil lay in advising the baker to readjust his moulder. The cure for the second lay in inducing him to lay each of the two pieces EXACTLY parallel in the pan.

This doesn't mean that if one of the pieces is badly placed in the pan it can be successfully and carelessly moved again to a straight position. Some loaves have shown a crevice in them extending upwards from the bottom towards the center.

This means that one of the pieces was shifted after being put in the pan. In the shifting some of the pan grease was picked up. It worked its way up the side of the piece shifted and prevented the two halves of the split-top loaf from sticking together.

Many loaves indicate that their bakers wanted a large volume and thought the proof box was the place to get it. Nothing could be more disastrous in baking practice.

MORE THAN HALF THE BREAD COMING IN TO THE INSTITUTE IS OVERPROOFED AND HAS A COARSE GRAIN, with poor color and texture. If the same bread had been put into the oven with less proof it would have had an oven spring that would have given the same volume with much better inside characteristics.

The opportunity to turn good dough into poor bread is present in the proof box as well as in the moulder and on the bench. A number of loaves recently showed the effect of too much heat in the proof box.

They had a poor color, poor grain, were overproofed, and showed they had proofed too fast, and had got away from the baker, possibly before he knew it. There was evidence of a lack of oven spring which showed the yeast had been harmed in the proof box and could not do its final task of giving good oven spring as the last change in the loaf in baking.

Similarly bread with a tough, rubbery, hard crust told a story of evil minutes in the proof box. The baking foreman had

turned on too much steam. Just as too little steam in the automatic proofer resulted in crusted dough, and streaky, lumpy bread, so too much steam in the proof box, had resulted in a rubbery, unsatisfactory crust.

Too much steam, like too much temperature, had also affected the oven spring. With regard to the proof box, the baker must ever remember that his best bakery tool is the thermometer. And that he must keep his proof-box temperature at

90°, with just enough steam in the box to prevent a crust from forming on the dough, to get the best results. There is no "about" or "approximately" in this matter. The temperature and moisture must be brought to the right point or the bread will tell the story of the baker's neglect.

Jarring in the Oven

Even after the bread is properly moulded, panned, and proofed, it is still not out of danger. Many loaves of bread tell the story of jarring in the oven. They tell it in the

A Little Journey

For Better West Coast Bread

O. W. Hall has worked for a year building better loaves of bread by mail. From the laboratories of the American Institute he has sent the message of the QUALITY LOAF broadcast. Anyone who reads this story will see the ripened views that a year of bread analysis have brought to him.

Now he is taking the field for meetings with the bakers—and their loaves. His tour begins in Denver, July 17, and takes in Utah, Idaho, Oregon and Washington cities. Through this tour many bakers will receive their first personal contact with the work the American Institute was organized to do. Many more may follow it.

form of a falling of the dough. The oven man must always remember that panned dough will not stand heavy jarring. In most of the cases where bread has been harmed in the oven, the dough was over-proofed in the first place. The dough had been up to its limit before the jarring, so that it fell easily. The danger from oven jarring, by the way, is another argument in favor of shorter-proofed doughs.

The Cut-Top Loaf

A loaf of bread of the cut-top variety will sometimes appear as if the dough had been pulled towards one end of the pan and knocked down. Such a loaf tells of another bit of carelessness in the bakery—the use of too dull a knife. No baker ever ought to touch dough with a dull knife. A grindstone is as much a necessary tool in a shop where cut-top loaves are attempted, as the moulder or proofer. A well made cut-top loaf is very attractive—but it is also very rare. Dull knives in the hands of inexperienced workmen are to blame.

There may be an impression that to obtain the good results suggested here expensive machinery is essential and the small baker cannot meet the conditions called for. This is untrue, for the most part. Most large bakeries have water spraying apparatus to keep the moisture right, for instance, in the fermentation room. Dough in the trough is thus protected from crust-
ing. But a baker can accomplish the same result by laying damp flour sacks over the dough and placing dry sacks above the wet ones. If the baker could see more clearly than the human eye permits he would know that over the top of his dough trough there is a rising cloud of vapor all the time, and that its departure means crusted dough unless remedial measures are taken. There is much discussion now of getting one more slice of bread per meal into the standard diet. Bakers know that better appearing loaves are easier merchandised loaves.

Macaroni Men's Discoveries

MACARONI men are finding what every group of men find who try to organize to “glorify their product and forget each brand.” Prophets of disaster have arisen in their ranks who assure the “little man” that the “big man” will eat him up. Certain men have adopted a “Let George do it” attitude similar to that of the western pioneer, who lagged a day behind the overland company. When those that worked in front, digging a road, came back to ask him to do his share, he replied that they COULD NOT ROLL THEIR ROAD UP AFTER THEM so he would ride along prettily a day in the rear.

He did, but in the end the story of his selfishness lived longer than he did and he died in shame with every neighbor's hand against him.

The macaroni preachers of co-operation may one day come to the American Institute of Baking or the American Wheat Institute that may come into existence to fulfill greater needs of greater co-operative units.

At the present stage of affairs they use these points of appeal, which should arouse a sympathetic response in the heart of every baker as well as every maker of macaroni:

1. We should promote the “EAT MORE WHEAT” movement, and add to the wheat slogan “Macaroni—a Good Wheat Food.”
2. We should enter into a program of educational advertising.
3. We should introduce a uniform cost system.
4. We should eliminate, entirely, ALL COLORING MATTER in macaroni products.
5. We should reconcile differences—lend a hand—and then see how different things will look to us.
6. No matter how big or how small you are, Mr. Macaroni Manufacturer, ORGANIZATION is what you need.
7. We must quit finding fault and advance constructive ideas.
8. We must confine our worrying to our

own business. Then we must build up a STRONG NATIONAL ORGANIZATION and let it do the worrying about our industry in general WHILE WE BACK IT UP at home.

9. We must all be big enough to rise above petty strifes and personalities that have in the past prevented us from doing our duty to our industry. Then we must build up from the inside and not tear down from the outside.

10. We must think of our affairs in terms of "the industry FIRST, then the manufacturer."

The macaroni men are splendidly backed up by their industry's organ, *The New Macaroni Journal*. With such an organ, and a program as outlined above, the country's organizing bakers, of course, will watch them through rapid strides of growth.

Bran Roughage

WHAT is it in bran that gives it the laxative effect so many dietitians shout about, as they try to drive the whole world to a bran or whole wheat diet?

One such dietitian put bran bread into a large Chicago hospital. Soon she found the patients were worse off than they were before and the bran bread was ordered off the hospital diet. "The scouring effect of the bran" was blamed in this case. We are seeking a full official report of the experiment and will give further details if this can be obtained.

On the other hand a chemist in the New York State experiment station is said to have fed bran to animals—ten years ago—before the modern bran cult occurred in Battle Creek and environs—with the phosphorus salt leached out. In that case the bran seemed to have no laxative effect whatever, this quality of the bran having disappeared with the phosphorus salts.

One of the new white breads is built up on this theory—the salts of the bran having been leached out and added to the dough mix of white flour. We have sent to the New York State experiment station for the text of the reported experiment in the cause of bran's laxative power. When it arrives it will be reproduced in this magazine.

A doctor of high standing, on being shown through a bakery, saw some whole wheat dough in the troughs. He said: "I would never recommend that for a steady diet. The scouring effect of the roughage is bad in the long run."

We applied to the American Medical Association for medical texts holding such views—or any other view of the dietary value of whole wheat or bran bread.

They referred all inquiries, in a friendly way "over to Battle Creek." We replied that we knew plenty of the Battle Creek view, but wanted the medical association view.

We were thereupon informed that "the facts are not known, and all we can do is to refer inquirers to the champions of both schools of thought."

At the meeting of the American Medical Association in San Francisco a paper dealt with a "new vitamin," and medical men present rose to proclaim that this so-called new vitamin was nothing more than "the scouring effect of the roughage in bran."

This leads to the hope that some feeding tests can be attempted at the Institute laboratories with bran, and with bran minus its phosphorus salts, for comparison. It will form an interesting basis for future nutrition work to determine once for all just what we are dealing with—the mineral salts of the wheat berry or the cellulose roughage—in taking note of whole wheat and bran nutritive qualities. This is one of the many questions on which the American Institute must seek new light through original research with wheaten foods.

Milk in Bread Making

Experiments Show It Possesses Marked Nutritional Advantages

By C. B. MORISON AND G. W. AMIDON

Of the Research Department, American Institute of Baking

(Continued from the June Number)

THE value of milk as a supplementary food in combination with wheat and its products has been well established by several authorities. The recent studies of Sherman and associates on growth and reproduction upon a simplified food supply have further indicated the marked nutritional advantages of liberal proportions of milk in dietary combinations with wheat, flour and bread.

Sherman, Rouse, Allen and Woods (27) conclude from their investigations that "a mixture of equal weights of bread and milk in which white bread furnishes four-fifths and milk only one-fifth of the total calories (or a corresponding mixture of dry bread or flour and whole milk powder), when fed from weaning time to young of both sexes from well nourished mothers, sufficed for growth at practically the normal rate but not for normal reproduction.

"On a ration containing the same proportion of milk (about one-fifth of the total calories) but with ground whole wheat instead of white bread or patent flour, young were successfully suckled (though at the cost of considerable loss of weight on the part of the mother), grew to maturity at somewhat less than the average rate, and in several cases have produced and successfully suckled young of the third generation.

"When the proportion of milk in the diet was made larger, so as to constitute one-third of the total solids, or about two-fifths of the total calories of the food mixture, the rest of which was ground whole wheat, the mother has suckled the young without undue loss of weight, and the young have

made a fully normal rate of growth, as have also the young of the third generation.

"When ordinary milk has been replaced by dried milk, or when it has been used in bread-making and, therefore, subjected to the heating involved in the baking of bread, there has been no evidence of any appreciable effect of such heating upon the growth-promoting property of milk as demonstrated in experiments upon rats.

"When even one-half of the water used in bread-making was replaced by milk, and still more when the bread was made entirely with milk instead of water, the improvement in the food value of the resulting breads (containing 5 and 10 per cent of their calories respectively in the form of milk solids) was strikingly apparent in feeding experiments upon growing animals.

"Increased rate of growth regularly followed increases in the proportion of milk in the diet from 5 percent up to at least 38 per cent of the total calories of the food.

"A female, which had been seriously stunted in early life by feeding upon bread alone, resumed growth at a normal rate when fed equal weights of fresh bread and market milk and later, when fed with a mixture of one part whole milk powder to two parts of ground whole wheat, was able to produce healthy young and suckle them successfully so that they grew at a fully normal rate and one of them at an early age produced vigorous young of the third generation."

An extension of these investigations by Sherman and Muhlfield (28) has shown the favorable effects of diets containing one-

CHART I

GROWTH CURVES MALE AND FEMALE ALBINO RATS,
SAME INITIAL AGE (45 DAYS) FED SOLELY ON WHEAT
BREAD MADE FROM PATENT FLOUR AND CONTAINING
1/5 OF THE LIQUID INGREDIENT AS FRESH WHOLE MILK
ACCORDING TO THE FEDERAL STANDARD FOR MILK
BREAD, F. I. D. 188 ISSUED JAN. 19, 1923.
SEE FORMULA B.

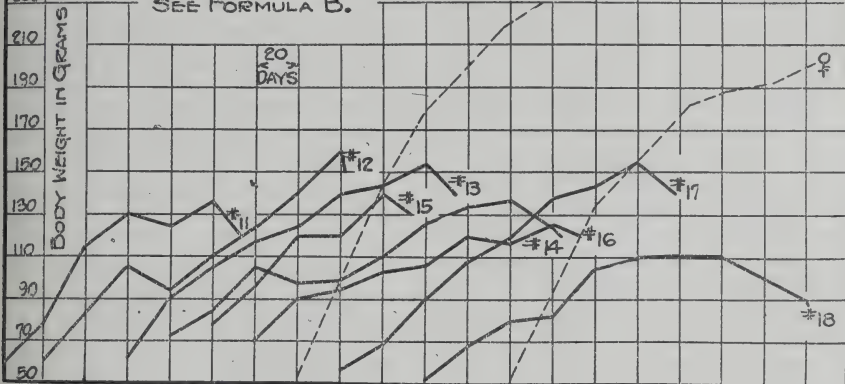
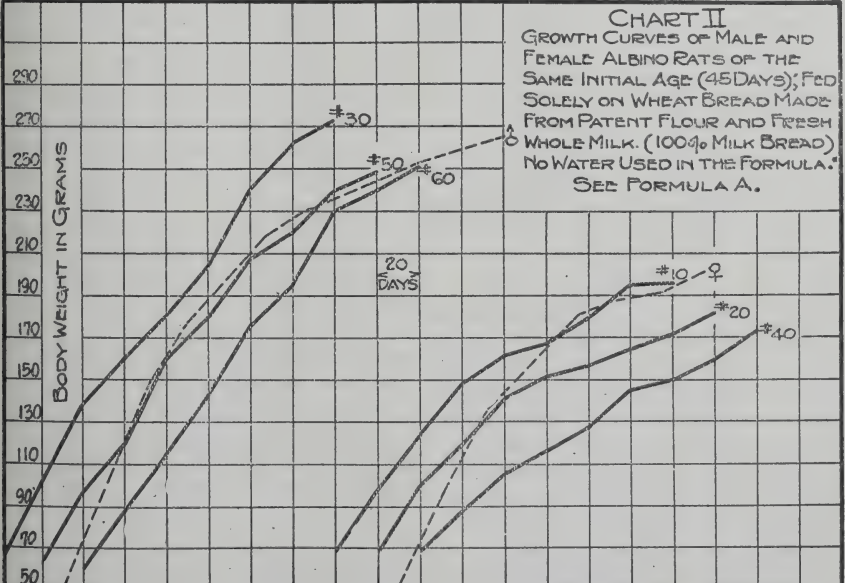


CHART II

GROWTH CURVES OF MALE AND
FEMALE ALBINO RATS OF THE
SAME INITIAL AGE (45 DAYS); FED
SOLELY ON WHEAT BREAD MADE
FROM PATENT FLOUR AND FRESH
WHOLE MILK. (100% MILK BREAD)
NO WATER USED IN THE FORMULA.
SEE FORMULA A.



The dotted line in these graphs is the line of normal growth.

sixth whole milk powder and five-sixths ground whole wheat, or one-third whole milk powder and two-thirds ground whole wheat, on the size of the litter, number of young successfully suckled, maintenance of body weight of the mother, higher average weight of young at weaning (four weeks), and a more economical utilization of calories of food consumed in rearing of the young to weaning age.

Sherman's Views

A third paper of the series by Sherman and Crocker (29) indicates the higher efficiency of growth as influenced by diets in which the proportion of milk is greatly increased so that it furnishes from one-third to two-thirds of the solid matter or 40-70% of the total calories of the food supply.

Sherman, Rouse, Allen and Woods, observed the favorable effects on growth of feeding bread made with milk in comparison with bread made with water. When rats were fed bread made entirely with water and containing no milk or milk products, there was no growth on the water bread except during the first three weeks, during which time previously stored material was probably being used. There was appreciable growth on bread made with equal parts of milk containing 5 per cent of its calories in the form of cooked milk. Marked growth was secured with the bread made entirely with milk and containing 10% of its calories as milk.

Milk vs. Water

When bread made with milk was fed as the sole food from the time of weaning, growth was nearly normal, while with the water bread no growth occurred. "The marked improvement in the nutritive value of bread thus shown to result from the use of milk in its preparation is, of course, attributed only in part to the vitamins and in large measure also to the proteins and mineral elements of the milk."

Food Inspection Decision 188, issued by

the Department of Agriculture January 19, 1923 defines Milk Bread as follows:—

"Milk Bread is the bread obtained by baking a Wheat Bread Dough in which not less than one-third ($\frac{1}{3}$) of the water ingredient has been replaced by milk or the constituents of milk solids in proportions normal for whole milk. It conforms to the moisture limitation for Wheat Bread."

In order to obtain information on the nutritive properties of bread containing milk according to this definition in comparison with bread made entirely with milk a series of feeding experiments were undertaken in the Institute laboratories from this viewpoint.

The bread used in these experiments was prepared according to the following formulas:—

Bread made entirely with milk

Formula A

Flour	100.00%
Milk	65.00
Salt	1.50
Shortening	1.25
Malt	1.00
Yeast Food	0.25
Sugar	1.50
Yeast	2.00

Milk Bread according to F. I. D. 188

Formula B

Patent Flour	100.00%
Water	43.00
Milk	22.00
Salt	1.75
Shortening	1.75
Malt Extract	1.00
Yeast Food	0.25
Sugar	2.25
Yeast	2.00

During the course of the feeding experiments five lots of bread were prepared from Formula A, and three lots of bread from Formula B.

Formula A

Average fermentation period.....	3 hrs. 43 mins.
Average time in oven.....	30 mins.
Average temperature of oven.....	480° F.

Formula B

Average fermentation period.....	3 hrs. 31 mins.
Average time in oven.....	30 mins.
Average temperature of oven.....	450° F.

The flour used in these formulas was a hard spring patent. Moisture 13.05%, protein (N. x 5.7) 11.50%, ash 0.45%.

The milk was a pasteurized market milk obtained from local sources. Total solids

12.30%, protein (N. x 6.38) 3.30%, fat 3.5%, lactose 4.72%, ash 0.78%.

The bread baked from these formulas was a one pound round top loaf with an average moisture content of 35-36% one hour after baking. In order to prepare it for feeding purposes the bread was first sliced and spread out to dry at room temperature. It was then ground to a coarse powder in a mill and thoroughly mixed so as to secure uniform distribution of crust and crumb particles throughout the mixture. The average moisture content of the coarse ground bread was 7.77% in Formula A, and 8.56% in Formula B.

The average analysis of the coarsely ground bread, calculated to a dry basis for purposes of comparison was as follows:—

Bread Formula A Average Analysis (Dry Basis)	Bread Formula B Average Analysis (Dry Basis)
Protein (N. x 6.25)....	15.27%
Fat	14.46%
Nitrogen free extract..	4.54
Crude Fiber.....	78.19
Ash	0.28
	0.23
	100.00

The amounts of protein, fat, and ash contributed by the milk as compared to the totals of these constituents as determined in the bread is as follows:—

Formula A	Formula B
Total protein	15.27%
Milk protein	2.15
Total fat	5.16
Milk fat	2.28
Total ash	2.60
Milk ash	0.51

The milk thus contributed 14.08% of the total protein, 44.19% of the total fat, and 19.61% of the total ash in A, as compared to 5.05% of total protein, 16.96% of total fat, and 6.72% of total ash in B.

The fuel value of the bread of Formula A, was about 414 calories per 100 gm. on the dry basis, and of Formula B, about 411.5 calories. The bread made from Formula A contained about 10% of the total calories as milk solids, and from Formula B about 3.4%.

The coarsely ground bread was fed to young albino rats of the same age confined individually in nine inch uniform round cages. There was always a supply of the bread ration in the food cups and fresh water was provided constantly in drinking glasses. The total food intake was not determined.

Chart I shows the growth of the rats on the bread made from Formula B containing 3.4% of the total calories as milk solids. Stunted growth is clearly evident. Reproduction, as might be expected was not secured on this diet. The growth curve of the rats fed on the bread made entirely with milk according to Formula A, (containing 10% of the total calories as milk solids) shown by Chart II, was fairly close to the normal for the males. Reproduction was not secured on this diet, but when the animals were placed on the complete stock diet for about three weeks followed by mating with normal animals raised from the time of weaning exclusively on the stock diet, reproduction occurred in every trial. The young were successfully suckled by their mothers and growth was normal.

The increased rate of growth shown by the rats fed on the bread made entirely with milk over that made according to F. I. D. 188, indicates strikingly the value of liberal proportion of milk in bread formulas.

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A Farmer's Grief—in 1805

BAKERS know that they made very little progress in merchandising methods until they put machinery in the bakeries and turned their thoughts from dough troughs to salesmanship. The wheat farmers seem to be in the same predicament at a corner of the same road the bakers turned some time ago.

The farmer's view-point on his wheat crop expressed below might be printed as having come from the National Wheat Conference. Actually it came from Edlin's "Art of Breadmaking", printed in England in 1805: "The farmer could never promise himself a certain sale for his commodity; hence instead of being sold at a moderate price it was frequently so dear that the poor knew not the taste of bread. Whereas, at other times IT BECAME A GREAT DRUG AND SOLD TOO CHEAP. Agri-

culture, under such conditions, could not be flourishing. The farmer, when wheat was dear, could not afford to buy seed to sow his land, so that the next year it was, of course, dearer still, and when by means of a very favorable season it happened to be cheap, the farmer whose wheat lay on his hands for want of purchasers, had neither heart nor spirit to sow for a new crop, when such quantities of wheat lay rotting in the granaries."

The condition is as true of the farmer in 1923 as in 1805. In all those years NOBODY BUT THE FARMER gave a care about the wheat crop and its marketing. It was to this era that the National Wheat Conference of 1923 brought a definite end. The formation of the WHEAT COUNCIL OF THE UNITED STATES, as an outgrowth of this conference, means that all who handle wheat-stuffs now recognize their co-operative fellowship with the farmer. William Deininger and Alex Taggart speak for the baking industry in a fellowship such as was never known before.

A Trophy Winner

WHEN a baker can win a trophy by sending in the best loaf among 200 loaves submitted in a contest, he has a just right to be proud, of course. And when the baker shares his spirit of leadership so that it inspires the whole crew of his bakery with the idea that they are part of it, the spirit of rejoicing, of course, pervades the entire plant.

The Log Cabin Baking Co., of Portland, Oregon, has won the Harry M. Freer trophy, presented by the W. E. Long Co., for the highest scoring loaf out of nearly 200 competitive loaves submitted by bakeries throughout the United States.

In this bakery there is no "big boss", making everybody else "knuckle" when he is around. So the management celebrate their victory by publishing the pic-

tures of the "prize-winning crew." In the crew are 24 men. All look happy in the picture, and proud of their achievement. In this same bakery the rack room has a maple floor for dancing. And the social parties of the bakery personnel are one of its big features. Bakers hunting for a way to create a happier industrial relationship are hereby referred to this happy, successful bakery.

A Case of Bleeding Bread

AN ACCUSED baker came to the American Institute of Baking to ask what, if anything, he had contributed to a loaf of bread to make a certain customer of his accuse him of "trying to poison her."

The baker brought a sample of bread that had offended, and Harold E. Turley, bacteriologist in charge of our microscopical work, quickly broke off a piece and ate it. He wanted to assure the baker that in spite of tiny red spots in the bread it was perfectly good food. These spots meant nothing more than the green spots in good cheese.

The particular bit of bread that had aroused a housewife was afflicted with one of the hot-weather bread troubles that is quite rare. It occurs only where there is an excess of moisture. In the past year it has been called to the attention of the American Institute of Baking only twice.

The trouble made itself evident in this latest example in the form of small red spots on the side of the loaf. In a former example the red spots had grown so big that they appeared as red streaks. The bread containing these red spots had a high moisture content, possibly due, in part, to absorption from the moist, hot atmosphere. The trouble has been variously called "bleeding bread," "blood rain," and "wunderblut."

If you think of bacteria merely as so much mustard seed floating around in the air in seed (spore) form, and seeking a

chance to grow, you can get a good mental picture of how the trouble known as *bleeding bread* comes about. The bacterium in this case is known as *bacillus prodigiosus*. Falling from the air upon the moist side of a loaf of bread it set up housekeeping because it found "a good soil for growth." This consisted of food, moisture, and warmth.

Mr. Turley found that in spite of its name *b. prodigiosus*, was one of the smallest of the bacterial forms. It was much smaller than the molds which cause trouble both inside and outside of loaves in hot, moist weather. It is about equal in size to *b. mesentericus*, the bacterium that causes rope, while the mold spores, one and all, were giants in comparison.

The manner in which *b. prodigiosus* spreads itself about is still a mystery to the scientists, as it has not been seen to form spores as the yeasts and molds do. While the bacillus is rod-like in shape the rods are so short that for a long time it could not be distinguished from the micrococci and it originally bore the name of *micrococcus prodigiosus*. A micrococcus is the smallest known form of bacterial life and it is round in shape.

Housewives have become alarmed at this "blood rain" or "blood patches" on many foods besides bread. They have found it on boiled potatoes, left in a dish containing water, in milk, and on all farinaceous foods. In the Middle Ages it was considered as of miraculous origin. The same appearance which made women nervous, and even superstitious, over it, made it of great interest to the scientists. They found it decorated itself with its brilliant red coloring, as an outside coat, or pigmentation that did not enter within the cell itself. By breeding it away from direct contact with sunlight they bred a colorless variety but it again grew a red coat when exposed to the sun on a proper medium.

Shortening in Sweet Doughs

It Adds Softening Factor to Otherwise Wood-Hard Product

By WASHINGTON PLATT

WHEN eating any food we experience a variety of sensations, some of which may be pleasant and others the reverse, the sum of which makes up the "eating qualities" of any food. The first of these sensations is the taste proper, though the word taste is often loosely used to include all of the sensations produced when food is eaten. Strictly speaking the taste is the sensation given by the organs of taste at the base of the tongue. These sensations are relatively simple being confined to sensations of sweetness, sourness, bitterness, and saltiness, with possibly a very few other elementary tastes.

We experience also the sensation given by the organs of smell. These sensations are often considered part of the taste, but should more properly be called the odor or flavor of food. This sensation is given entirely by the volatile constituents. Another set of sensations is of equal importance to the other two. For lack of a better term I will call this "the chewing properties" of the food. It is, namely, the physical feeling which the food gives us in our mouths. The food for example may be tough or tender, hard or soft. It may dissolve easily or it may be insoluble or gummy. These chewing properties have much to do with the pleasure of eating. They are also closely associated with digestibility, as foods which are tender and dissolve easily are more quickly and thoroughly attacked by the digestive juices.

The chewing properties are also of tremendous money value. Consider for example the difference between a tough and a tender steak. Certainly both of them

would have the same effect on our organs of taste and smell, but one of them is unpleasant to eat, indigestible and brings a low price per pound; the other is just the reverse and its price is in fact largely fixed by its tenderness.

Consider also any of the standard ginger-snaps on the market made with shortening. They are popular with the public, command a fair price, and are sold to the extent of thousands of pounds each year. The same snaps made in exactly the same way except for the omission of shortening would have the same appearance and would give practically the same sensations to our organs of taste and smell. A snap made without shortening, however, would be as hard as a piece of wood and would hence be deficient in its chewing qualities which are so important. Such snaps would be impossible to sell in any quantity at any price. The chewing properties of a food are, therefore, of the first importance from many points of view.

Wood-Hard Products

In biscuit baking all of the ingredients as well as the methods of handling have an effect upon the final chewing properties. However, the one ingredient which has by far the largest effect, is shortening and it is this ingredient which we will consider. The fundamental effect of shortening is to make any baked product easier to break. For the sake of clearness we may take the following definition: "Shortening is any fat or fixed oil used as an ingredient in baked products. THAT MATERIAL HAS THE GREATEST SHORTENING POWER, WHICH WHEN BAKED IN A DOUGH UNDER STANDARD CONDITIONS GIVES TO THE PRODUCT A MINIMUM BREAKING STRENGTH AND A MINIMUM CRUSHING

An address before the National Association of Cereal Chemists at its Chicago Convention.

strength, OR CRUMBLING FACILITY.

The present paper is a review of the action of shortening in baked goods and an attempt to determine some of the reasons for the difference in the shortening power of various fats and oils. We will confine our consideration to the ordinary sugar cookies including gingersnaps, but much of what is said will be of general application to all types of baked goods. In some baked goods, however, the principles here set forth will be over-shadowed by other factors of a different nature.

A biscuit of the kind named would contain:

Flour.

Sugar.

Ammonium - Bicarbonate.

Monocalcium - acid-phosphate.

B i c a r b o n a t e of Soda.

Water.

Shortening.

If we should mix a dough of this kind without shortening we would find that all of the ingredients are either soluble in water or wetted by it. Such a dough is essentially a concentrated solution of sugar, certain inorganic salts, and proteins in which are soaking the starch grains and unsoluble proteins of the flour. Such a dough is, therefore, essentially a continuous mass and it remains so after baking. It may contain holes due to the formation of gas, but the biscuit forms a solid continuous mass around these holes just as cement may form a continuous mass around the stones which are mixed into it. Such a biscuit made without shortening is

as hard as a piece of wood.

If we now add any form of shortening to such a dough we introduce an ingredient of a kind entirely different from any of the others, in that shortening is the one ingredient in the dough which is not soluble in water or wetted by it. Shortening must, therefore, remain distinct from the rest of the dough. It does in fact distribute itself thru the dough in droplets or layers often coating the starch grains and strands of gluten. This structure of the shortening extending throughout the mass but remain-

ing distinct from the other ingredients can in fact be seen in the dough and in the finished biscuit under the microscope by the proper methods of staining.

What is the effect of the shortening distributed through the biscuit in this manner? Suppose we should try to glue together two pieces of wood with greasy surfaces. They would not stick together because the layer of grease would prevent the glue from forming a firm contact with the wood. Suppose again,

we should attempt to make concrete, using stones which had been soaked in oil. We would find that the cement would not stick to the stones and that the films of oil distributed in such a manner would make cracks and faults which would make the whole structure crumble so that it would have comparatively little strength.

View of John Tyndall

Exactly the same effect is brought about by the shortening in a biscuit. It extends

Wood-Hard Crackers

And Then Some Softened Ones

If you want to find out what shortening does, bake a gingersnap with the shortening left out. It will be wood-hard. Shortening will make it soft, pliable and easy to chew. Before he became the chief chemist and milk expert of the Merrell-Soule Co., Washington Platt worked in a gingersnap factory. He peeled ovens with the best of bakers, and now he is one of the best informed scientists in our industry. He has the rare—among scientists—faculty of clear, direct, and popular expression and this magazine hopes to present often his views on any scientific topic he may have to do with.

in layers throughout the dough and prevents the different parts of the dough from coming into contact and forming a solid mass. Shortening forms as it were a multitude of minute cracks in the dough or finished biscuit which prevents it from forming a continuous mass. This action of shortening is similar to the action of paraffin paper used in wrapping caramels. Without these thin layers of paraffin paper a box of caramels would become one solid mass. Such then is the fundamental action of shortening.

In these ideas I find that I have been to a certain extent anticipated some fifty years by the well known scientist, Tyndall, in his book "Fragments of Science." Speaking of pastry, Tyndall says, "The volition of the pastry cook has entered into its formation. It has been his aim to preserve a series of surfaces of structural weakness, along which the dough divides into layers."

Such an action will be characteristic of any oil or fat whether of animal, vegetable, or mineral origin. We find, however, that there is a tremendous difference in the shortening powers of different oils and fats. MINERAL OILS HAVE MUCH LESS SHORTENING POWER PER POUND THAN THE FATTY OILS AND AMONG THE FATTY OILS WE FIND DIFFERENCES. IT TAKES FOR EXAMPLE FIFTEEN OR MORE POUNDS OF COCOANUT OIL TO GET THE SAME SHORTENING EFFECT IN A BISCUIT AS TEN POUNDS OF COTTONSEED OIL. Let us see what are some of the factors governing the shortening power of the various shortenings. The viscosity and surface tension against air are not controlling factors as fats having the same viscosity and surface tension differ widely in shortening power. Similarly the melting point alone is not a primary factor.

Plasticity a Factor

The plasticity of the shortening at the temperature of mixing seems to be a factor of the first importance. Plastic fats are mobile enough so that they extend through

the dough in the process of mixing yet they hold their shape and position so that the films of fat do not run together and finally run out of the dough. Such fats seem to hold gas better than others. We find, therefore, plastic fats such as lard and lard compounds at the head of the list in shortening power. Another factor of the first importance seems to be the content of unsaturated glycerides which each fat contains.

The following list shows the percentage of unsaturated glycerides in the common shortenings:

Cotton-seed Oil	75%
Lard	60%
Lard Compound	60%
Butter	38%
Cocoonut Oil	5%
Liquid Paraffin	0%

If we arrange these fats in the order of their shortening power we find the following (fats with the greatest shortening power being given first):

Lard.
Lard Compound.
Cotton-seed Oil.
Butter.
Cocoonut Oil.
Liquid Paraffin.

It is quite noticeable that this order is nearly the same as that given above except that lard and lard compounds are both pushed ahead. This may be due to the fact that both of these shortenings are noticeably plastic at mixing temperatures.

Molecular Arrangement

Langmuir (1), Harkins (2), and others have shown that at the interface between two immiscible liquids the molecules tend to arrange themselves in a definite position. As Wilson and Barnard (3) express it, this is the position in which the molecules would be the most "comfortable." For example, in a layer of fat on water the glycerine end of the molecule would extend towards the water and the hydrocarbon tails of the molecule would extend up into the fat.

These workers found that to saturate

glycerides such as tripalmitin, tristearin, etc., occupied essentially the same space on the surface of the water. They found, however, in the case of unsaturated glycerides such as triolein that both the glycerine and the double bond part of the molecule was drawn down onto the surface of the water so that such molecules occupied nearly twice as much surface as the saturated molecules. Expressed in terms of shortening this would mean that unsaturated shortenings would cover twice as much of the surface of a dough as the saturated shortenings.

Langmuir's Views

Langmuir's own words are: "The saturated fatty acids cover approximately equal areas per molecule irrespective of length of hydrocarbon chain. The glycerides cover about the same area as the fatty acids obtained from them. The unsaturated fatty acids all cover much greater areas per molecule than the saturated. The double bond in oleic acid is thus apparently drawn down onto the water surface. It is interesting to note, however, that linoleic acid, with its two double bonds does not cover any greater area per molecule than oleic."

We see, therefore, that we cannot take the iodine number as such as a measure of the shortening power of a fat, inasmuch as trilinolein with an iodine number of 173 does not have any more covering power than triolein with an iodine number of 86. For this reason we must convert the iodine numbers of the shortenings into percentages of unsaturated glycerides before we can use these figures as a measure of shortening power.

Harkins' Experiments

Harkins and his co-workers have come to conclusions similar to those of Langmuir. They have also worked out the energy relations of oil and water interfaces, studying the total energy of the surface, work of cohesion, work of adhesion, spreading coeffi-

cient, etc. They find that "the presence of double bonds increases the cohesive work very slightly and the adhesive work very greatly," *i. e.*, the presence of double bonds in a shortening not only cause it to cover more surface but such double bonds cause a fat to tend to spread and to adhere more closely to the surface of the dough which is covered.

Quality of Oiliness

It is very interesting to see how our conclusions regarding the influence of double bonds on shortening power parallel the conclusions of others on the influence of double bonds on lubricating power. Older workers on lubrication, especially on the conditions of static friction, realized that fatty oils had a lubricating power superior to mineral oils.

They called this quality "oiliness" and it is rather amusing to see how some of the older writers tried to define and explain this quality of "oiliness." I remember about ten years ago the former Chief Chemist of the Pennsylvania Railroad attempted to explain to me the superior oiliness of lard oil compared with any mineral oils. He knew that there was a real difference but he had an extremely hard time to explain just what it was. Being an honest man he did not try to cover up his ignorance in general remarks about surface tension.

Wilson and Barnard (3) and also Bingham (4) have recently explained this property of oiliness as the attraction of the double bonds for the metal just as we have pointed out the connection between shortening power and the attraction of the double bonds for the aqueous constituents of the dough.

References

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2. *J. Am. Chem. Soc.*, 39 (1917), 354, 541; 42 (1920), 700, 43 (1921), 35.
3. *Ind. Eng. Chem.*, 14 (1922), 683.
4. "Fluidity and Plasticity," New York, 1922.

A Vitamin Bulletin

WHEN the Agricultural Experiment Station of the University of Arkansas recently issued a bulletin on the newer knowledge of nutrition grouped under the name of "Vitamin Discoveries," school teachers asked for 9,000 copies of the bulletin.

Outside of the schools many people displayed interest. The head of a lumber company distributed 2,000 copies—one to each family in the lumber company's camps. Women's clubs, teachers, physicians, home demonstration agents, nutrition workers, and health organizations helped to spread the gospel of a better dietary, we are assured by the *Journal of Industrial and Engineering Chemistry*.

When vitamin publications first came out, an assault upon the newly-found deficiencies of white bread seemed to be their most dramatic element. Now that the baking industry has responded to the new discoveries with new breads, offered in great variety for those on limited, deficient diets, praise takes the place of the former condemnation. Readers of this magazine who observed the growth charts of animals, printed in the June number, saw lines of growth on loaves of bread, that cannot be duplicated at present, and never has been duplicated, by any other SINGLE food the world has ever known. The new loaf of bread was, of course, prepared after intensive study of the vitamin requirements of the human body and the deficiencies of all known foods, taken by themselves. Its meaning is being grasped by the nutrition workers, which means that the baking industry is saved from the necessity of further defending itself from their assaults.

Food Officials Meet

WHEN the food officials from the 47 states which have food and drug laws come together for a meeting of the National As-

sociation of Food and Drug Officials at Duluth, Minn., on August 14, they will hear more than they have ever heard before about the new, scientifically-controlled baking industry.

Dr. H. E. Barnard, secretary American Bakers Association, who was himself a food official for over ten years in Indiana, will be a principal speaker at the convention. He will tell his former associates in public life about the great strides in the baking industry by which it is shaping bakery development in a way to conform to every sanitary and pure food regulation.

The association plans a four-day meeting, under the chairmanship of I. L. Miller, of Indianapolis. On August 14, milk will be the subject for discussion. On the 15th the state and county fair will come in for a discussion of its sanitary environment. Cafeterias, lunch wagons and other eating places will be discussed from the standpoint of the protection of public health.

Before the four-day session is over almost every known form of food will be taken up from canned salmon to vinegar. A bill to make all vinegar of standard strength, for instance, will be talked over with a view of having it uniformly adopted.

Besides hearing from Dr. Barnard on bread and bakeries, the food officials will make a tour of inspection through the plant of the Zinsmaster Bread Co. W. C. Geagley, secretary of the association, states that all bakers desiring to attend will be made welcome and will have all convention privileges except voting.

Number ten, BAKING TECHNOLOGY turned up on my desk this morning and I settled down for a feast of reason. I think BAKING TECHNOLOGY is fine, but it seems to lack something; perhaps it is the eye burning advertising, such as one is so accustomed to, for which the gods be thanked.

—J. C. ENRIGHT, Pres. Old Fashioned Millers.

Chemists on Bread

WHEN the Industrial Division of the American Chemical Society meets at Milwaukee, September 10, it will have just one subject for discussion. This subject will be: "BREAD."

Not a single speaker on the program will be a baker, but all will come from the ranks of the scientists to whom the study of bread is now an important part of their scientific routine. Dr. H. E. Barnard, director of the American Institute of Baking, in his capacity as a member of the American Chemical Society, will preside at the meeting on bread.

Papers on bread problems will be six in number, including all phases of the subject from flour production to the nutritional advantages of each bread type.

The topics to be taken up are:

1. Flour—Its manufacture.
2. Flour—Its physico-chemical characteristics.
3. Bread materials—How they are purchased, how formulas are set and carried out in production.
4. Control processes—How the baker regulates temperature, flour storage, fermentation rooms, mixer, oven, proof box, cooling rooms; humidity, in fermentation rooms, proof box and oven, synthesized operations, etc.
5. Bread—Its rôle in nutrition. A discussion of the new developments which our growing knowledge of vitamins and nutrition is stimulating.
6. Possibly some discussion of world wheat production, having in mind the probability that within a few decades our increasing population and diminishing wheat acreage will present a most vital problem.

Some of the prominent speakers before this Symposium will be: Professor Bailey, University of Minnesota; Professor Gortner, State Experiment Station of Minnesota; Dr. G. C. Thomas, Atlas Bread Factory, Milwaukee; Professor Worth Hale, Harvard Medical College.

Bread—at the Grocer's

HAVE you, as a baker, ever wished you could say all that's on your mind about the grocer who sells your bread? You soon may have a chance to do so, for when American bakers assemble at French Lick, Ind., for their September convention, a speaker will be present from the Better Grocers' Bureau.

This speaker will describe to bakers a most interesting development now under way in the membership of the National Association of Retail Grocers. This national association sees that the retail grocer must come into closer contact with the manufacturer and wholesale trade factors of the lines he offers for sale. It also sees that the national association has much to teach its members—as every national association has.

The Better Grocers' Bureau is the educational medium for bringing the grocery business up to the nearest possible approach to its potentialities. It lists 17 objects and purposes, all of which are aimed at allowing the "retail grocer to take his proper place in the world."

Through this bureau the organized baking industry will form a contact with the organized grocers' business, and anything one group should know about the other will thus be easy to disseminate through both.

Coming for Help

WHEN will bakers from all over America be coming for help like this? Deppen's Bakery, Alamosa, Colo., writes: "We are pushing toast for breakfast. If it is possible please send me some copy that could be used in the local papers as advertisements. Bakers are not always as good at writing advertisements as they should be, and while what you may submit may not entirely fit, it will give one a good idea."

Books for the Baking Laboratory

THE NEWER KNOWLEDGE OF NUTRITION. The Use of Food for the Preservation of Vitality and Health. By E. V. McCollum, Ph.D., Sc.D., Professor of Chemical Hygiene in the School of Hygiene and Public Health of the Johns Hopkins University, Baltimore, Md. Second Edition, Illustrated, 449 pp., The Macmillan Co., New York, 1922.

The first edition of this well known work was a small volume of 199 pages. The present edition has been entirely rewritten by the author and greatly expanded by the addition of new chapters and a more extensive development of the subject matter.

It consists of eighteen chapters of text which treat of important phases of the nutrition problem from the contemporary standpoint.

The first three chapters are largely concerned with the historical background of modern nutrition study and methods of investigation. The personality and opinions of the writer are apparent on every page, so that the effect on the reader is rather different from the usual reaction to compilation of sources written from a purely objective standpoint.

The investigation of the individual nutritive properties of foods has led to a better knowledge of how the various articles of the diet should be combined so as to make good each other's deficiencies. As Dr. McCollum states, "The keynote to the discussion of the individual foods entering into the diet of man is the importance of using proper combinations of foods."

The discussion of the dietary properties of food-stuffs, chapter six, pages 124 to 153, is full of interest for those concerned with the use of wheat and its products in food production, such as the bread and cracker industries.

Dr. McCollum writes under paragraph 124 of this chapter, "Bolted Wheat Flour need not be condemned because of its deficiencies. The attitude which one should take toward the relative merits of bolted as against whole wheat flour is now easy to understand and appreciate. The latter is decidedly more suitably constituted to maintain well-being for a short time if it serves as the sole article of diet, as it might be under conditions approaching famine. Whole wheat flour is, however, a decidedly incomplete food, and needs to be supplemented with other foods in order to compensate for its deficiencies. The unfortunate individual who through faulty habits of living finds at an age at which he should be still in possession of the full vigor of middle life, that his efficiency is

diminishing and the joy of life slipping away, has not infrequently turned for relief to substituting whole wheat flour for the staple white variety. As a rule those who advocate this practice exhibit in some degree the spectral mien of the dyspeptic. They would gain much more through adhering to a diet well balanced than through clutching to this or any other dietary whim or fad."

The general reader as well as those with a special interest in food problems will find "The Newer Knowledge of Nutrition" a fertile field for the gathering of new ideas and a better appreciation of what is going on in the study of nutrition, from the personal viewpoint of one of the pioneers in contemporary research in this field.

C. B. M.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Nutrition in School Children. Taliaferro Clark. J. Am. Med. Assoc. 79, 519-24 (1922).—The varying and alarming percentages of malnutrition reported by different observers suggest an inquiry as to the exact meaning of the term malnutrition. The American and foreign standards are discussed and physicians urged to display more interest in nutritional problems.

L. W. RIGGS.

The Extraction of Flour from Wheat and the Use of Substitute Flours in Bread Making. Arpin and Fleurent. Ann. fals, 15, 362-8 (1922). The degree of extraction of flour is the amount obtained by milling 100 kg. of wheat. Owing to variations in the quality and composition of various wheats, the same degree of extraction would not give a uniform flour. Moreover, the degree of extraction cannot be determined from the characteristics of the flour. In order to obtain the maximum amount of flour A. and F. suggest establishing a standard grade by milling the best wheat under the most favorable conditions and taking everything suitable for breadmaking. This would be known as "whole wheat" flour, and it would be forbidden to make flour whiter than this standard, which would be renewed, say every 3-4 months. Of the substitutes

grown in France and its colonies (rye, barley, maize, buckwheat, and rice) rye (up to 10%, but preferably 6-8%) and buckwheat (about 10%) can be used, the others being unsuitable.

A. P.—C.

Vitamin Review. W. S. Long. J. Am. Assoc. Cereal Chem. 7, 156-67 (1922).

The History of the Calorie in Nutrition. Mildred R. Ziegler. Sci. Monthly 15, 520-6 (1922).
E. J. C.

The Distribution of Vitamin B in the Wheat Kernel. Marion Bell and L. B. Mendel. Am. J. Physiol. 62, 145-61 (1922).—Vitamin B was determined from the growth of mice fed "synthetic" diets in which the wheat product being tested was the sole source of vitamin B. Marquis spring wheat contained considerably more vitamin B than did Minnesota winter wheat, 15% of the former in the diet and 40% of the latter being about the minimum sufficient to meet the requirement for growth. Vitamin B in the Minnesota winter wheat was divided among the various milling products about as follows: patent flour, 0 to 5%; first clear, 10 to 15%; second clear, 5%; low grade, 16%; middlings, 40%; bran, 24%. The minimum amount of each product in the diet adequate for normal growth was about as follows: whole wheat, 40%; first clear, 40% (?); second clear, 40%; low grade, 20%; middlings, 10%; bran, 20%. Experiments with hand-dissected portions of wheat showed that vitamin B is present both in the embryo and endosperm. The concentration in the former is several times as great as that in the latter, but the absolute amount contained in the germ is not over 16% of the total amount in the grain. Wheat grains were cut in half crosswise and equal amounts of the two ends fed to different animals. The rate of growth induced by both ends was practically the same. J. F. LYMAN.

PATENTS

Shortening for Foods. H. V. Dunham. U. S. 1,432,057, Oct. 17. Uncooked flour or similar material containing unbroken starch granules is mixed with sufficient H_2O to form a fluid mass, mixed with an edible oil, e.g., coconut oil in amount to constitute 20-70% of the final product, homogenized at a temperature below that which would break the starch granules, and then dried at a similarly low temperature to obtain a powder which can be sifted.

Shortening for Foods. H. V. Dunham. U. S. 1,431,938, Oct. 17.—Wheat flour or a similar

starchy material is boiled in H_2O and emulsified with coconut oil or other normally solid edible fatty oil.

Flour and Dough of Regulated Hydrogen-ion Concentration. C. G. Harrel, U. S. 1,429,504, Sept. 19.—Different varieties of flour are tested and blended to obtain a mixture having a definite pH, so that the required period of dough fermentation in bread making or the like can be accurately determined, provided all other variables remain constant. Tests of wheat are also proposed for blending

Bread. W. Watson, D. W. Kent-Jones and Woodlands, Ltd. Brit. 181,397, May 3, 1920.—In bread making, a small quantity of hypochlorite or chloro-hypochlorite is added to the flour before it is made into dough. The salt may be added to the flour in powdered form, or a solution of the salt may be sprayed onto the flour or added to the doughing water.

Bread Enriched with Vitamins. C. Hoffman, H. D. Grigsby and N. M. Cregor. U. S. 1,431,525, Oct. 10. In order to prepare bread rich in H_2O -soluble vitamin B, substances are added to the usual dough ingredients to augment their vitamin content, e.g., rice polishes, wheat germs (admixed with bran as usually obtained in milling) or maize germs. These materials may replace sugars ordinarily added to dough batches. The materials are treated with C_6H_6 or CCl_4 to extract fatty substances and are then cooked with H_2O to gelatinize their starch and treated with a barley malt infusion to saccharify the starch. The extract thus obtained may be filtered and evaporated to dryness in vacuo.

Bread. W. Watson, D. W. Kent-Jones and Woodlands, Ltd. Brit. 182,140, March 4, 1920. Bread is made from flour which has been mixed with NH_4HSO_4 and Cl or a compound containing Cl. Suitable Cl compounds are HCl , $MgCl_2NH_4Cl$, the double chloride of Mg and NH_4 , or harmless chlorates, perchlorates, or hypochlorites. A portion of flour may be treated with gaseous Cl or HCl , or liquid HCl , or with the other reagents mentioned and added to the remainder of the flour. Pyrosulfates or persulfates may also be added. Cf. 17,614, 1907, 2778, 1911 (C. A. 6, 1947), 1194, 1912 (C. A. 7, 2254), 21,012, 1912 (C. A. 8, 972), 5405, 1913 (C. A. 8, 2910), 9539, 1913 (C. A. 8, 3333), 1690, 1915, 117,917 and 137,365 and C. A. 16, 3716.

Watching the Baker Grow

TIME was, not so long ago, when anyone who suspected his town's bakers started a crusade to herd the town's women folks back to the kitchens.

The women have learned to laugh at that idea, and to tell their men folk to wake up to the fact that "them days is gone forever."

Now, from a small town in Indiana, comes another and a newer idea. It is applied by the men folks—but with a sprinkling of women folks combined in the movement.

Some people who wanted to know whether they were getting the very best bread it was possible to bake, got a motion through the Community Club, calling for a community investigation.

Here was a test for the town's bakers! Five bakers offered bread in that town. The Community Club's officials wanted to know all about the bloom of each loaf, the texture, the volume, the color, the taste, and the keeping qualities of each individual loaf. How different was this from the days when community clubs all worked together to decry every cent in cost of baker's bread above the lowest level known anywhere, for any kind of bread, in any part of the country!

This particular Community Club wrote Edward Clissold, editor of *Baker's Helper*, an alert magazine of the baking industry, for advice. Mr. Clissold advised the Community Club to send the five loaves of bread it wanted to learn about, to the American Institute of Baking.

Loaves and a letter duly arrived, asking for the score of each loaf. Hundreds of bakers receive scores on their bread weekly now, from the laboratory conducted in these headquarters by O. W. Hall of our service department.

But the town whose Community Club wanted to know about the town's bread, was not among these. One of the loaves submitted was found to be suffering from the hot-weather affliction of rope. A telegram of warning was sent at once. Possibly it saved the baker from an epidemic of loaves so afflicted which by their taste and odor would have given his bread a general reputation from which he could not recover in many months.

He was told how to offset rope infection and guard against it during the remaining hot weather.

All the bread from all five bakers was found to be from young dough. Yet most of it was excellent bread. The scores ranged from 87 to 92.

The Community Club was assured that it was being served with good bread by every single baker. Then the bakers were told in detail how each one could build up his bread to a still better level. It was seen that UNIVERSAL CONFIDENCE was much better than universal mistrust based on the poor showing of one or two bakers. These Community Club members will make an intensive study of each baker's product of course. They will talk about the comparative merits of each loaf. How will such things be when the bakers of such towns can invite the clubs, such as this inquiring one, over to the bakeries, and invite them to make critical surveys?

Many leaders of our industry say the time is coming when bakers will have to meet such tests—when women will universally demand to be shown all about the baker and the bread they are called upon to trust. Such leaders established the American Institute of Baking, and its BREAD SCORING SERVICE. It is their contribution to the drive for a UNIVERSAL QUALITY LOAF.

BAKING TECHNOLOGY

*A Journal of
Applied Science
in Baking*



*Published by
The American Institute
of Baking*

VOL. II

CHICAGO, ILLINOIS, AUGUST 15, 1923

No. 8

Warren G. Harding—Employer

WHAT was it that made the people of America rise in one mighty mass to pour out their love and regard for Warren Gamaliel Harding? We read the story of the printer, whom he helped to set type when things were rushed; we read the story of the editor under him on his Ohio paper, whose wife had always reason to be thankful for his unmolested vacations. We read the story of all who had helped him along—and found all felt that they had lost a golden-hearted friend. And we could think of others besides Harding when we thought of him. We could think of

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Hughes and Hoover—strong men whom he allowed to work under him and in his cabinet and was not jealous of their countenance and standing before the world.

Once we knew a president—intimately—intimately enough to see his cabinet officers one after another struck down as his jealous ire was aroused against them. Intimately enough to see every friend who

came to help him betrayed in a personal way and sent out with bleeding knuckles and heavy heart because his chief could not stand him upon the horizon, the chief believed should be entirely for himself.

There is something of the superman in this tolerant spirit Harding showed. Lincoln and Roosevelt almost alone among our presidents have shown it to the same degree. There is a splendid set of books every employer in America should read—every employer who can strike down personnel under him, or let this personnel come through in the terms of personal growth and achievement for their firm as well as for themselves.

These books are the memoirs of three men who stood around Lincoln, for when you think of Lincoln you can think of Grant, Sherman, Sheridan, McClure, as well, just as you can of the strong men around Harding.

There came the time when General Grant was betrayed by a telegraph messenger. The messenger decamped for the Southern lines with messages meant for the General, and for not obeying the orders in those messages Grant received from Stanton, his superior, a curt, officious summons of arrest. He was relieved of his command and ordered to Washington to explain an already advertised "spirit of insubordination."

Stanton gave Grant no hearing, of course. Without a hearing he had so far committed himself against Grant that he could not retreat. But Lincoln heard Grant, and found out everything there was to know. Then he ordered Grant back to his job—back to his lines to win another victory so Stanton could again cast aspersions on him and order him under arrest for some trivial, unprovable charge.

Thus it went until Lincoln was surrounded by the same kind of faithful followers who get around every leader and advise against anybody and everybody who is striking any decisive blow in his cause. McClure, one of them, even intruded after all the others had left. Their croakers' chorus was, "Grant must be

spared—must be removed." To McClure, as he himself tells the story, Lincoln said quietly after hearing him up till midnight: "I can't spare Grant, he fights."

In every organization are men who fight—until they bring down jealousies, resentments, suspicion upon their head from self-interested associates. How many of them are "spared" right in the midst of their work and how many see the advantages of their organization woefully sacrificed just in order that one leader may assert his power to cut the others down?

Lincoln could not spare his workers halfway through their tasks—and so it was with Harding.

This thing comes home to the baking industry. There was a time when Secretary Hughes raised his hands to heaven and cried out: "Oh! what a day for public service."

He was then in the midst of notifying a soon-to-be Governor of New York State of his selection as a gubernatorial candidate. Hughes was a strong man, as was Hoover. Yet Harding gathered him in and—let him do his work. He rescued the departments of the government from the shambles into which they had been thrown because of a total lack of ability to trust and build subordinates.

Finally Hughes gained a disarmament agreement for America and the great powers. His name flashed upon every lip. He had done something for his country. One heard in those days the whisperers at work—they told President Harding he must look out for Hughes. They warned him that Hughes was "making face." It was the kind of warnings whispered in an earlier day against Leonard Wood when he was ready with the troops he had trained to lead them to France.

But the "cut-him-down" advice did not prevail with Harding against Hughes. Petty-minded people sent forth their

whispers against Hoover, similarly. They did not prevail. And all the good work both of these men had done redounded to the President's praise and his glory when he went at last to his final sleep.

This means much within the baking industry. It is hard to trace lines back, but in the room below the one in which this is written two men wrestle with the problem of baking pans. They have had to ask all elements within the industry about baking pans—their sizes, variations, and the possibilities of standardization.

Why? Because when Warren G. Harding trusted Hoover enough to set him at tasks, and allowed him to fulfill them, one of the tasks that inveigled Hoover's mind was the task of standardizing sizes for American manufacture. He was hurt by the hundreds of bed sizes, for instance, which called for hundreds of mattress sizes and hundreds of spring sizes, while these in turn called for hundreds of blanket sizes and bedspread sizes—and so on down through the co-related lines.

We feel the thrust from Harding again right in this magazine, for beside this article is another by Alonzo Taylor. This great leader, tolerated by Hoover and built up by him as much as Hoover is in turn built up by Harding's spirit, tells us the place of bread in relationship to all other foods.

Shall We Learn?

During the war the writer of these words went to many strikes involving war munitions. Supposedly they were strikes between capital and labor. His job was to hear the often red, heated words of the leaders of both sides. Soon he became convinced that the so-called feuds between capital and labor are not such feuds at all. They were feuds between bullies and men overfilled with job cowardice until they had bucked back. The question was "who could raise his eyebrow to whom"

—who could be cock of the walk and make all others shiver and shamble to a corner.

Here in Harding was a builder of job happiness—not of job cowardice. It gave his workers joy to work for him and joy to pay tribute to him when he was gone.

The baking industry everywhere is spotted over by such men and such firms. It is easy to see their good works whenever you encounter their employees.

Now in the spirit in which Harding found out about his fellow workers and associates—the open-minded spirit—how many bakers are coming to French Lick Springs for the Council, for the Pipe of Peace, for the Pow-Wow that will make our baking industry **STRONG** in organized power?

The latest word is that out of nearly 500 reservations the allied trades are in a vast majority. This ought not to be. Co-operation and growth, and the spirit of growth can never cluster around a group whose people cannot come to conference and can not fall into step with their fellows.

Harding himself has given us a great theme to work on. Through Hoover he has drawn attention to the malnutrition among the city-born children and the work that must be done to save such children. Here in the American Institute is a chemist at work finding out how to make the most nutritious loaf. If you come to the French Lick convention you will learn of the National plans that call for such bread, as insurance against malnutrition.

Out in Spokane there is David Ackerman—who built himself up from a very little baker to the biggest in his town—just by going to the National convention, keeping his ears open, keeping his eyes open, and building after the manner of the enlightenment he received. He worked in the Harding spirit, as you and all of us can, to build our industry.

Dangers of the Refilled Sack

If Poorly Cleaned in the Bakery, They Return to the Mill Unfit for Use as Flour Containers

By DR. H. E. BARNARD*

SHOULD there be dangers in the refilled flour sack, the practice is one which must be given the careful consideration of the food officials and sanitary officers. If the practice is not dangerous, it hardly is one which should command your attention. It is my purpose, therefore, to analyze the situation as I find it in the milling and baking industry, for the purpose of giving the best thought of the men who sack flour for shipment, and who empty those sacks into their bins at the bakery. Even a casual discussion of the subject convinced me some time ago that the ideas commonly held as to the virtues or vices practiced, were too general and too varied to be of any real help to the official who is interested in protecting food, or to the miller and baker who are so closely concerned with the use of sacks.

And so in an endeavor to collect data for your consideration which would at least have the virtue of being the best thought of millers and bakers, I addressed a questionnaire to men in these industries whose opinion I knew would be valuable.

The following questions were asked:

1. Is the practice of returning flour sacks to be refilled objectionable?

2. If so, why?

3. What kind of flour sack, if any, can be refilled without danger of contamination or lossage?

4. If flour sacks are refilled, how should they be cleaned? (a) by beating..... (b) by washing.....

5. Have you personally known of unclean sacks being used?

6. Give specific instances.

Nineteen flour millers, including the best millers in the country, and representative bakers answered the questionnaire.

It has been a very difficult matter to analyze the replies. Opinions always vary, and on this subject they varied widely. I know of no better way to reach a general conclusion than by analyzing the replies to the several inquiries, and so with your consent, may I briefly present them to you:

Nine of the 19 millers answered "Yes," unqualifiedly to the first question: "Is the practice of returning flour sacks to be refilled objectionable?" Three said "Yes," but qualified their assent; four replied "No," unqualified; three replied "No," qualified.

Miller No. 1 says:

From the mill point of view it is objectionable for the reason that there is considerable expense in recleaning them. Many sacks are returned in a dirty condition, infected with weevil and we hate to have them coming into the mill. Not as satisfactory to bakers as if new sacks were used.

Miller No. 2 says:

Sacks are often received that are unclean and unfit for use, also frequently poor quality sacks.

Miller No. 3 says:

Bakers effect a great saving by refilling bags—sacks torn in transit are sent to factory and mended. If bags

*In an address before The Association of American Dairy, Food and Drug Officials at Duluth, Minn., Aug. 16.

are not cleaned by baker they are cleaned by miller before repacking. If practice was stopped cost to bakers would be enormous.

Miller No. 6 says:

We feel that it is very peculiar with all the laws we have regarding "pure foods" that the use of second-hand sacks is still permitted. Larger bakeries take fairly good care of sacks but average second-hand sacks are not fit to be used. Many second-hand bags not strong enough—they burst and cause considerable trouble. Prohibition of practice would not be economic mistake; would in no way increase cost of bread to consumer.

Other Views

Other objections and comments are as follows:

Flour should reach customer in best condition possible, but this is not possible with second-hand sacks. Many sacks are returned with dough adhering to them, danger of sacks being "buggy." We wish customers would never use second-hand sacks for we take pride in having our product reach the baker in perfect condition.

Sacks sometimes come to us quite clean and some in very dirty condition.

Sacks are not returned to us properly cleaned; sometimes there is mouldy flour in them, sometimes they are infected with weevil. If the seamless grain sack is used and properly cleaned and taken care of, it is an economic practice. We prefer to ship in new sacks always. If sacks are unfit to be used they are returned to sender.

Sacks may be refilled if cleaned as soon as emptied. Many bakers store empty sacks in a damp place, for a month at a time, without cleaning

them and they collect dust, grease and vermin; bags decay and are not strong enough to be repacked—danger of bugs spreading in mill. If the baker will properly clean and store the bags as soon as they are emptied, it will very materially reduce the objections to the practice.

Oftentimes the sack is partially rotten, and liable to be easily broken; moreover it is seldom that a sack is entirely clean and it may contain flour filled with spores which will contaminate the flour placed in the bag and cause musty or mouldy flour.

Use of bags made of heavy, closely woven material is not seriously objectionable. Other than seamless bags harboring weevil, moths, etc., are not strong as new bags and often burst when refilled. Believe millers generally would like to see practice discontinued.

Often not properly cleaned. We never use second-hand sacks except for bakers—they are the only ones who know how to take care of bags.

Often Contaminated

No objection if baker takes good care of sacks and cleans them properly. If bags are contaminated they should not be used. Some bakers buy special bags of high grade material and take pride in keeping them clean, and there is no reason why they should not be permitted to use them; the saving is about \$100 per car. Whether or not sacks should be refilled depends entirely upon individual flour container and individual baker.

We run all returned sacks through sack cleaner, turn and beat them in separate building. If bags are unclean with paste or other material they are not used. We have machine for darning small rents. Sometimes mills

become infected with moth from second-hand sacks.

Trouble is among smaller bakers only; sacks are not apt to be caked with dried dough. Sacks from larger bakeries are generally clean. Many second-hand sacks burst. Sacks are sometimes shipped in dirty cars and come in reeking with odors which are absorbed by the flour. Grain sacks and heavy duck sacks can be refilled a number of times without damage. We inspect returned sacks carefully and sacks unfit for use are returned to sender.

Sacks are rarely properly cleaned.

The Practice Opposed

Of the 45 bakers answering the first inquiry, 10 were unqualifiedly opposed to the practice. One qualified his opinion; 25 bakers were not opposed to the practice; four were not opposed if certain conditions were met with; five other bakers either did not follow the practice or owned their own sacks and their conclusions may perhaps very properly be taken as opposed to the practice.

It is very difficult to classify the conclusions of the bakers for there is much diversity in their opinions. I am attempting to divide them into groups in favor of or opposed to the practice. Some of the comments are as follows:

Great danger of weevil if not properly handled and cleaned. Have seen sacks refilled after being turned and used with dirty side inside.

Looks bad to the public; not safe or sanitary. Danger of weevil. Bakers who follow this practice would have difficulty in convincing public that they were using first-class flour. Might use second-hand sacks if we could be sure of receiving the bags returned from our own company.

Prohibition of this practice would

be an economic mistake and would create great waste and increase cost of flour.

Generally speaking, practice is all wrong. Bags may become very dirty in transit—saving can amount to but little.

Expense and flour loss more than cost of sacks.

We use new misbranded or selected clean sacks at a great saving.

Have never in four years had any trouble due to uncleanness or vermin. Empty sacks are cleaned each day in a sack cleaner and, therefore, give no trouble. We send sacks to local mill where they are refilled and returned.

We return "new jutes" to be refilled—sometimes twice if sacks are in good condition; believe it is economy to do so if properly cleaned.

We believe there is considerable economy for the baker in buying his flour on a bulk basis and using his own sacks for two or three times.

Our sacks are cleaned and only those that happen to be dirty are washed—we never have flour stick to the sacks—never use sacks for anything but flour.

Hard to get them clean—they allow flour to sift through.

Loss by leakage greater than cost of new jute sacks—practice insatiable and cause of increase of contamination.

If sacks are not thoroughly cleaned there is great danger of decay, thereby causing trouble should flour be loaded in them. No danger if they are properly cleaned. Do not believe they could be used more than a third time; flour would leak out and dirt would sift in. If sacks are properly handled we consider it a big saving.

If we could not return sacks to be

refilled it would increase our flour cost at least \$10,000 a year.

Sacks to be refilled should be cleaned, shipped in clean cars and in bundles entirely covered with burlap; re-cleaned sacks almost as good as new.

Mills sometimes use other second-hand sacks than those sent in by company; on one occasion we had flour shipped us in a fertilizer bag; danger of weevil especially during hot weather. Empty sacks are sometimes in transit for considerable length of time—danger of contamination from dirty freight cars.

Have never suffered any loss or contamination by reason of second-hand jutes; bags were clean and only sound ones used. May be danger of weevil—subject a scientific one.

If mill is careful in shipping flour in clean sacks, if bakers caution men to keep trucks clean and the bakery is always clean, there is no danger of having dirty refilled sacks. When our sacks are empty they are cleaned and packed under covering for shipment to mill. If sacks become soiled and unfit for flour they are not used for that purpose.

Always specify new jute sacks in our orders; never buy flour in second-hand sacks. Sacks may be refilled if carefully renovated, yet do not think it a practice which should be encouraged.

Some Are Refilled

The answers to the third inquiry: "What kind of flour sack, if any, can be refilled without danger of lossage or contamination," were equally diversified. Two millers said that cotton, grain or jute sacks could be refilled; four specified seamless grain sacks; two limited the grades of sacks to cotton or jute; 13 bakers felt that

cotton sacks could be refilled; 13 others favored the refilling of grain sacks; three of seamless sacks; one of burlap; five of jute.

The conclusions as to the type of sack most suitable for refilling are not very definite. It is apparent that there is some confusion in the minds of both millers and bakers as to the best type of sack to be used in packaging flour.

Preventing Contamination

The replies to the fourth inquiry: "If flour sacks are refilled how should they be cleaned? (a) by heating..... (b) by washing" are equally diversified. Four millers said that the sacks should be cleaned by beating and washing; six by beating only; four said that the sacks should be passed through a cleaning machine. The following comments by millers are of interest:

It is impossible to prevent contamination except by steaming or washing with boiling water which is impractical; cleaning machine does not put sacks in good condition.

If bags have not been wet they can be cleaned by turning and beating.

By beating, shaking and suction; should not be washed.

By a regular cleaner and then washed.

They should be cleaned in washing machine.

The most desirable way for cleaning bags would be by air treating and then running the bag through some process of sterilization to destroy bugs or vermin that may still be left in the seams of the bag. Washing is bad as it shrinks the bag too much.

Beating not thorough; washing not practical.

Views of Bakers

Twenty-seven bakers believe that flour

sacks can be cleaned by beating, although some of the answers indicate that additional treatment is necessary. The following comments are worth noting:

They should be thoroughly cleaned. Best method not by beating, but by using an apparatus somewhat similar to the squirrel cage carpet cleaner, that carries the sacks up the wheel and drops them a few feet. Sacks should be washed if dirty.

By beating; washing shrinks cotton sacks.

They should be cleaned by beating to kill weevil.

They should be cleaned with vacuum cleaner.

They should be cleaned by beating; washing every other time.

They should be cleaned by beating, washing not profitable.

They should be washed and fumigated, but washing may cause paste.

They should be cleaned by beating, also by chemical process.

Beating is satisfactory.

They should be cleaned by beating and shaking.

They should be cleaned by beating and later with vacuum.

They should be cleaned by beating—washing if soiled.

They should be cleaned by beating; washing O. K., but sometimes impractical on account of shrinkage.

They should be cleaned by beating, washing when dirty.

The fifth inquiry, "Have you personally known of unclean sacks being used" is of special interest. Five millers said that they had never known of unclean sacks being used for packing flour; seven admitted that they had seen such sacks used;

nine bakers had experienced trouble with unclean sacks; 34 had never had any trouble.

One miller wrote:

I have in mind one shipment of sacks returned to a miller a couple of years ago which contained small amounts of flour in a filthy condition. The sacks, both inside and out, were covered with a blue mold.

Another miller said: "Complaints have been too numerous to mention."

A third said:

I don't care to give specific instances but frequently a customer insists that he wants the particular bags that he sends filled, irrespective of whether or not the mill thinks they should be used.

One baker replied:

We have known of sacks being shipped in unclean cars which gave them an odor, and we have also received flour in same condition.

Another baker said:

Sacks cannot be placed in bundles without their getting more or less dirty.

A third baker confirms this opinion by writing:

Sacks returned to the mill are often spoiled in transit.

Conclusions

It will not easily be possible for either miller, baker or food official to conclude from such an analysis as that I have just given you that flour sacks should be refilled or that the practice should be abandoned. It is, however, possible to reach certain conclusions which may be summarized as follows:

1. Flour sacks which are moldy, dirty, leaky, or contaminated by foreign odors

should not be refilled until they have been put in proper condition for use by cleaning or mending.

2. Bakers intending to ship the flour sacks to the mill to be refilled should install suitable processes for thoroughly cleaning the sacks at the time they are emptied, and sacks so cleaned should be carefully bundled and kept in a dry place, free from mold, and protected against insect infestation.

No miller should pack flour under any circumstances in any sack which is not in good condition, both from a sanitary standpoint and from its capacity to hold flour without leakage and waste. Flour sacks which have been rendered objectionable in appearance by paint or tar or unpleasant staining should never be refilled, not because the contents may be injured, but because of the bad psychology attending the use of a package for food which is not clean and attractive. This point is emphasized by a baker who writes: "It is necessary for the baker to live down the reputation that he uses a poor grade of flour. By using flour in new, clean bags we have convinced the public that the flour we use is of first-class quality. If the public saw second-hand sacks go into the bakery it would naturally believe the flour inside the sack was also of low quality."

The economic advantage of using food containers until they are unfit for further use hardly need be discussed. If flour sacks can be used over and over again under conditions which preserve the wholesomeness of the contents and prevent loss in transit, there can be no objection to such saving.

In order, however, to insure the proper protection of the flour which goes to the bakery, every means provided for the protection of food or food materials in process of manufacture or distribution should be utilized, and the food inspector may well

be charged with the duty of cooperating with miller and baker in setting up an inspection service adequate to this end. In the development of food control, the food official, whether he be executive, chemist or inspector, has seen his work steadily change from a purely regulatory practice to that of cooperative and constructive effort, and in the solution of the particular problems which we are now discussing, I am convinced that the official working with the miller and with the baker will perform a real service, both to the millers and bakers of flour and to the public which is so largely dependent upon the production of wheat for its daily bread.

More Graduates

DR. C. B. MORISON, head of the School of Baking of the American Institute was able to announce last week that the quota for the September class was entirely full and that he was beginning to register pupils for the January course.

On August 9th graduating exercises were held at the Institute for a class of 29 young men, every one of whom went to a position waiting for him in some baking plant. David P. Chindblom sent the boys away with an address of warning and caution against many of the "excesses" into which enthusiasm has led some young bakers. He warned against "show bakeries" where costs drink up all the profits; against elaborate installations that the trade does not justify; against fancy-priced ingredients that do not return their value in quality. He stressed as the one important thing to know the value of a loyal and active organization. He told how an overreaching executive could kill spirit and initiative on the part of employees, and how kind consideration was the great morale builder.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

Published by the
AMERICAN INSTITUTE OF BAKING
1135 Fullerton Ave., Chicago

Entered in the post-office at Chicago, Illinois, as second-class matter, under the act of August 24, 1912.

Price, Fifty Cents a Number; Five Dollars a Year.

AUGUST 15, 1923

We Work Together

*To win through quality production
and the utilization of scientific research
a welcome for two loaves of wheaten
bread for every one that now finds favor.*

Getting It Done

WHO knows when any municipal, state or federal intervention in commerce forced costs down? There was once a mayor in New York who believed he could save the people from \$8 potatoes in 1916 by furnishing the farmers' seeds and buying their resulting crop at \$1 a bushel—contract made in May for October delivery. Through George W. Perkins the thing was done, Mr. Perkins acting as chairman of the Mayor's Committee on Food Price Relief.

All went well until the potatoes arrived and were offered for sale. Good women bought them—and brought back pecks and half-bushels of plow-cut potatoes. No farmer cared how he plowed up his crop when his sale was assured for him. Other women brought back quarts and pecks of field dirt. The farmer hadn't cared how much dirt he put into the sack when he knew his buyer was contract-bound to take his offerings and had no expert watchman "wise in market tricks."

Tenderfoot managers stored the potatoes where a blizzard ruined them because there was no heat. A sad, ragged remnant of experimenters with commercial ways they knew nothing about sold the sad, ragged

remnant of the Mayor's potatoes to the Otis Elevator Company "in bulk" and sighed mightily in glad relief. No food consumer profited so much as a penny's worth.

We were one of that group. In memory of our adventure, and many another like it, we do not feel any thrill of impending victory when the mayor of this or that town declares buoyantly he will put his town in the bread business "to bring down the price of bread."

Our Disciplines

WHAT, as a matter of fact, would be harder than to actually impose upon the American public in the matter of bread prices?

What other industry faces the potential competition at all times of a woman who asks no salary for her work, needs no special overhead, seeks no special capital investment to back her, and can accomplish the making of her daily bread with arm power, a yeast cake, a dish pan and a kitchen stove as her sole equipment?

So long as there is flour and yeast in the grocery stores and a kitchen range at home, here is relief from any oppression in bread prices that is easier than can be had in any other essential food. There is no alternative of paying or going without. There could be no greater tribute to the bread baker than that he has grown in the face of such competition; has gained capital slowly to industrialize his craft; has become the baker of bread to the women of our nation.

It was all done by service and a winning of the women away from their drudgery; never by gouging, by coercion, or the playing of monopoly markets. The baker stands where he does today by the free will and consenting approval of the housewife whom he has served mightily.

Not only does the baker live by the housewife's good will alone but every time his prices afford the hope, even, of profit, the "shoestring baker" can leap into activity without capital, or with no more of it than the little required for a stove and a mixing pan. These disciplines have been at the baker's elbow in all the years of his emergence from dough-trough slavery to industrialized production. His place is thus made secure, and those who feel surest this year they can teach him much, are forgotten next year with all their promises and schemes. The baker's price, for his survival, has automatically to be "right." If not, it is the sheriff and not the mayor who calls to demand his accounting.

Yeast and Ice

HOW many bakers, when they get their yeast in the morning, leave it lay for hours on top of a flour bag, or on a table where the temperature is as hot as all outdoors?

If bakers thought of their yeast in terms of millions of growing plants, with a will to grow when the temperature is right so strong that 120 square inches of exposed surface would support a railroad train's weight before the cells below could cease to reproduce because of the counter-pressure, they would hardly be so careless.

Drop some ants on a piece of ice and see how they become numb and dead. Then roll them off and see how lively they become, once a living temperature is restored to them. Of course you won't, because it is needless cruelty, but if you dropped an ant in a bucket of boiling water or on the floor of a baker's oven it would die.

"Cold numbs, heat kills." That sounds simple and obvious. But when John Tyndall performed an experiment like that with a piece of ice and an ant, and then applied the lesson to bacteria and yeast he became

the most famous scientist of his time. He urged all hospitals to BAKE their bandages just as the baker bakes his bread, in order to sterilize them. Thus was born the modern science of medical sterilization.

Just so refrigeration was discovered to be the means of numbing all kinds of yeasts and bacteria into inactivity. The baker's problem is no different from the doctor's or the fermentologist's. Refrigerated yeast means numbed, inactive cells, with their strength fully conserved for the dough batch. Your yeast deserves a place of honor in the ice box, and it is a foolish loss of its power to treat it in any other way.

Hail Bread as King!

THE caption on this paragraph is copied from the *Chicago News*, a daily newspaper. It seemed to be the headline of a bakers' convention. But it was nothing of the kind. It led the reader's interest down into the narrative of a meeting of flour millers. Time was when no such linking of flour with bakers' problems would have been possible. Now the miller really is thinking and talking in terms of bread and bread sales. In Chicago two conventions of operative millers were attended by visiting bakers. And they felt as much at home as if they had been in a closed meeting for bakers only! Thus the "old order changeth"—but with such speed that it makes most everyone stop and gasp for breath, ourselves included.

Premiums

WHEREVER premiums are offered by bakers, there the bakers have not "thought through" to the inevitable consequences of their folly. They have not seen how they invite greater premiums from other bakers, and so on to the destruction of all and the abandonment of sound merchandising principles.

Bread's Place in the Diet

It Is Preponderatingly a Carbo-hydrate Food

By DR. ALONZO E. TAYLOR

Director, Food Research Institute of Leland Stanford Jr. University

CONSUMERS' wants and motives that determine household selection of and effective demand for food stuffs may be grouped under five headings:—physiological, psychological, social, habitational and economic. These overlap, naturally, but such groupings may nevertheless be segregated. In a period of prosperity, with full employment and rising prices, in the upswing of the business cycle, the psychological and social wants claim free expression. In hard times with unemployment, in the down-swing of the business cycle, motives of economy perforce prevail.

The motive of economy and the pressure of price tend to operate against the physiological competency of the diet. We have, however, no quantitative measurement of this trend. On the other hand, the physiological quality of the diet need not improve *pari passu* with income. There is indeed **a striking amount of sub-nutrition to be observed in the families of the well-to-do.** Knowledge of physiology should enable the family with adequate income consistently to maintain proper nutrition. It should also afford the family with low income protection against impairment of nutrition in periods of price pressure. On this hope is based the theory of popular education in nutrition.

Under physiological wants and motives we include the nutritional requirements determined by experience and experiment. There is some instinct in eating, also racial experience; but experiments with animals and observations on sick human beings have provided the broad foundation for knowledge. The organism requires (a) bal-

anced protein, (b) mineral salts in proper kind and amount, (c) the several vitamins, (d) a certain amount of roughage and (e) fuel foods in proportion to the needs of the body. The relative needs of balanced protein, vitamins and salts are highest in the young and decline toward old age. It is possible to cover the needs of a people in a per capita statement by assuming that in a mixed population, such as ours, 100 census persons correspond to 86 unit adults. This is a liberal computation that covers fully the particular requirements of the growing children in our population.

The psychological wants and motives revolve largely about the special senses and the aesthetic tastes. In a certain sense we may say that physiological need finds expression in hunger, the psychological wants in appetite. The color, texture and other appearances of food, odors, flavors and temperature are all moments in the psychological criteria of the diet. In addition, the food must meet aesthetic requirements in derivation and preparation, and in service as well. It is commonly assumed that the psychological reactions to the diet are subordinated and tend to disappear in times of need, but this may not prove true in a highly developed population. The American people would react to famine very differently from Russians, Chinese or East Indians. On the other hand, the psychological wants in the diet are easily exaggerated and may result in gross extravagances.

Under social wants and motives are grouped a number of heterogeneous influ-

ences resulting from creed, caste, superstition, tradition, custom in all classes and refinements in the leisure class. The Jewish abjuration of pork, the Romanist exclusion of meat on Friday, the meatless Lent, many arrangements of foodstuffs in the three meals and indeed within the meal, are illustrations of the social factors. Just as there are vestiges of instincts in hunger and appetite, so there are relics of savagery and barbarism in the social factors. Frequently the practice remains, though the origin has been lost. These factors fall naturally into two groups. The home meal is a central function of family life and about it are grouped a large number of social, educational and spiritual motives. These are veritable internalities. About public eating places are grouped a series of social customs which, though externalities, have an influence on the demand for foodstuffs. These social factors may operate in favor of a particular foodstuff or opposed to it and exercise together a considerable influence on consumption.

The Servant Era

By habitational factors we understand the influences that are imposed by limitations or facilities in the habitation. The plantation type of diet was based on unlimited servants, fuel and kitchen equipment. The standard of subsistence in the modern small apartment of our cities is based partly on scarcity of servants and a minimum of fuel and cooking equipment.

In response to the modern kitchenette installation, the methods of packing, preparing and serving foods are being definitely modified. The developments in food manufacture have made kitchenette existence possible; on the other hand, concentration of living in cities has set new problems to the food manufacturer. Certain foods lend themselves better than others to this type of family life and thus the habitational environment reacts on the diet. In particular, the miniature apartment with kitchenette equipment does not lend itself to proper keeping of raw foods

and this tends to restrict the use of fresh milk, fresh meat and green vegetables.

The economic motive rests on the necessity or desire of restricting the fraction of the family income that goes into subsistence in order to augment savings or enlarge the means available for household furnishings, rent, clothing and the innumerable sundries and incidentals that have become necessities in the modern existence. With workers' families of

Gasoline or Growth?

In these days when nutrition workers claim the world, in part, goes hungry to save enough money for the Sunday gas supply, what's to be done to see that children get tooth food, bone food, eye food—and do not grow up with flat chests, weak muscles, and bow legs?

Here comes Alonzo E. Taylor, greatest of our nutritional authorities, telling us the relationship of bread to the rest of our foods. You will want to study this appraisal of bread by an outside, disinterested authority. How can bread be improved till it takes a larger place among the nutritional foods of the land? The question is one our bakers must find the answer to.

small income, punctilious economy may be necessary in order to secure a decent subsistence and avoid debt. Families of larger income frequently practice as punctilious an economy in order to secure enjoyments in other directions. The economist's theories of abstinence and waiting find illustrations in the middle-class American family supported by investments. It is common in summer resorts and winter resorts to find

people denying themselves their accustomed subsistence, sometimes even a proper diet, in order to enjoy the life of the resort.

Food and Gasoline

There is considerable evidence over the whole country that food is skimmed in order that gasoline may be purchased. With these phases of modern existence—the over-development of the out-of-work-hours' entertainments—we are not here concerned. For us the importance of the problem lies in the fact that the standards of normal nutrition must be maintained despite pressure of price on income, despite claims of competing amusements, accessories and non-essentials.

What is necessary is so to educate the public in nutrition that the psychological, social and habitational factors are adjusted to circumstances in such manner that economic pressure does not impinge on the physiological factors. The public must be taught to save without injury to nutrition. It must be taught to employ the advantageous psychological, social and habitational wants and motives without ruinous result on the incomes on the one hand or injurious result on nutrition on the other hand.

Between different wants are sharp distinctions in dispensability. Demand for certain things is almost inelastic, for other things highly elastic. Within all wants are gradations. Within a particular demand, the satisfaction of the first fraction of want is inelastic, while later fractions become successively more elastic. What is necessary in popular education is to tie up the economist's conception of wants and demands with the physiologist's conception of indispensability and adaptability of foodstuffs. This means that we must divide foodstuffs into two groups: within one, adaptations may be freely made on the basis of price; in the other, particular food-

stuffs must be secured quite irrespective of price. Such a segregation of foodstuffs into premium-priced and calorie-priced groups is given in the Chart.

From this chart it is clear that the indispensable factors in the diet may be secured within the first 1200 calories. Thereafter, considerations of custom, taste, convenience or price may determine the selection of the remaining foodstuffs. As we survey the development of the American Diet during the last three decades, certain trends may be discerned. Some of these are peculiar to us. Others are of a general character and have been observed in other countries.

Are Sugar Lovers

We are a sugar-loving people. The present high consumption of sugar is not to be explained by the Eighteenth Amendment to the Constitution. Our consumption of sugar in the manufactured state, particularly with fruits, is very high. We have an almost universal predilection for confectionery and sweet beverages. Last year the per capita consumption of sugar was almost half that of starch in cereals.

At first sight this is a remarkable state of affairs. When, however, one compares the cost of refined sugar per calorie with the cost of bread, meats or vegetables, it is clear that sugar was relatively and absolutely cheap during 1922. At twelve cents per pound it is still relatively cheap. When a popular food is cheap relative to others, consumption is certain to rise and this was the chief explanation for the rise in consumption of sugar from 85 to over 100 pounds per capita in 1922. War experience has taught that sugar is a most effective food for workers.

Milk and Education

The educational movement in furtherance of consumption of milk is unquestionably having effect. With each decade, the efficiency of milk production is im-

SEGREGATION OF COMPONENTS OF DIET

3600 Calories per Day per Unit Adult

Maintenance Foods

(Calories per Pound Foodstuff)

600-700 Calories

Premium-Priced

500-600 Calories

Premium-Priced

Fuel Foods

(Calories per Pound Foodstuff)

2400 Calories

Calorie-Priced

Milk, 1 Quart 600-700	Raw	
		Lettuce 90 Endive 80 Romaine 90 Escarole 90 Chard 90 Celery 80 Cabbage 140 Watercress 90 Carrots 200 Tomatoes 100 Cucumbers 80 Apples 260 Oranges 210 Lemons 170 Grapefruit 180
	Cooked	
	Greens 100 Cabbage 140 Onions 210 Carrots 200 Tomatoes 100 Artichokes 200 Asparagus 90 String Beans 110 Rhubarb 100 Celery 80	Spinach Beet Tops Turnip Tops Dandelion Chicory

(a) Predominatingly Protein Food

Beef 800-1800
 Veal 600-1000
 Pork 900-3000
 Mutton and Lamb 1000-2000
 Viscera 400-800
 Poultry and Game 600-1800
 Eggs 700
 Fish 300-700
 Shell-fish 200-500
 Cheese 1800-2000
 Dried Beans and Peas 1500
 Nuts 2000-3000

(b) Predominatingly Carbohydrate Food

Wheat
 Rye
 Corn
 Oats
 Rice
 Barley
 Sugar 1800
 Potatoes 350-400

1600-1800

(c) Fats

Butter 3400
 Lard
 Other Animal Fats
 Vegetable Oils
 Compound Fats

3900-4000

(d) Other Vegetables

Green Peas and Beans 400-500
 Beets 220
 Cauliflower 140
 Sweet Corn, Canned 600
 Eggplant 120
 Parsnips 290
 Pumpkins 110
 Squash 200
 Turnips 180

(e) Other Fruits

Apricots 240
 Bananas 400
 Berries 200-300
 Cherries 320
 Cranberries 200
 Currants 240
 Dates, Dried 1400
 Figs, Dried 1300
 Grapes 300-400
 Melons 100-300
 Pears 250
 Pineapples 300
 Plums 300-400
 Prunes, Dried 1200
 Raisins 1400

proved and the quality enhanced. As the practice of testing dairy herds becomes disseminated, we observe the year's output of milk per cow to rise which means a cheapening in production. A great deal remains to be accomplished in the sanitary distribution of milk, viewed from the standpoint of cost. Years ago, the countryside consumed much more milk than the cities. With the perfection of centrifugation, refrigeration and transportation, this deficiency of the urban population is being overcome. Indeed, in some sections of the country, milk is being shipped out to cities to the nutritional injury of the rural population. More and more the dairy cow is being recognized as the central figure around which diversified agriculture rotates. It is certainly a matter of particular importance that the advantage of agricultural and the improvement of human nutrition are in accord at this point.

Fruits and Vegetables

The past two decades have witnessed a thorough-going improvement in the growing assembling, packing, storage, refrigeration and shipping of fruits and vegetables. These have almost ceased to be seasonal. For practical purposes, it may be said that the majority of the fruits and vegetables that were seasonal in their consumption twenty years ago have become staples throughout the larger part of the year. In part, this has been a response to the American demand for diversity in the diet and has been accomplished at high cost. In part, however, it is the expression of efficiency in operative procedures that have resulted in lowering of costs. The marketing and distribution of raw leaf vegetables has not been organized and perfected as in the case of raw fruits, so that these indispensable items in the diet of the urban population at present carry a price that is relatively too high.

When semi-developed countries have

cheap land and a free range, the people enjoy a high meat ration. This was the case in our country in the last century and is still the case in Australia, where the per capita meat ration is about 250 pounds per year. As the type of farming changes, as the range passes into frontier tillage and frontier cropping develops into diversified agriculture, with increasing value of land meats become expensive and consumption declines.

Our earliest trustworthy statistics on meat consumption date only from 1907. Since that time meat consumption in this country has apparently declined about 20 pounds per person per year, to roughly 150 pounds. This is to be interpreted largely as the result of inefficient retail marketing and increase in the cost of meat and the free availability of fruits and vegetables. Cereals, fruits and vegetables have practically driven meat, outside of bacon, from the American breakfast table. In part this change has been an expression of taste and convenience; in part, however, it has been conservation by price.

Bread Ration Rises

It has been the experience of Europe that with the development of urban industries and the concentration of population in cities, the bread ration rises. This is partly the result of price, partly of convenience. In a period of high urban wages, meat consumption is apt to increase, to decline again in favor of bread when times become less prosperous. The extension of baker's bread at the expense of home-baked bread apparently tends in the direction of increased bread consumption.

The scarcity of servants and the modern type of kitchenette apartment operate against the consumption of meat except for quick cuts and in general act in favor of such articles of the diet as are of easy preparation, can be purchased ready to serve, and particularly are to be purchased

in such small amounts as to be consumed in one meal. A large population in our cities lunches on tidbits and desserts and dines on delicatessen. The obvious defects of this type of diet are only to be overcome by the inclusion of an amount of milk larger than would be necessary in the normal diet.

Income Considerations

The lesson that needs to be enforced is to teach the usefulness of following price considerations with all foodstuffs in the general group of calorie-priced articles, but not to apply it at all in the group of indispensable foodstuffs. The outlay for food in different Caucasian countries varies apparently from 30 to 60 per cent of the income. The higher the income plane of the family, the lower the percentage of the income expended for food. The lower the income plane of the family, the higher the percentage of the income expended for food. Within a particular plane of family income, in prosperity, the absolute amount expended for food tends to rise, though the percentage may remain constant or fall. During hard times, the amount expended for food may remain constant, but the percentage of the income expended for food rises.

The housewife has two main adaptations. She may save in other directions for the benefit of the food supply.

She may execute the food purchases in the direction of efficiency, as represented by calories per unit of currency. With larger income more food is wasted, dearer foods are purchased, less home produce is used, more prepared foodstuffs are consumed, the seasonal variations are utilized more, house stocks tend to increase and more service is employed. When the income falls there is less waste, cheaper articles are substituted, more home produce is eaten, home cooking tends to be revived, fewer seasonal foods are purchased, house

stocks are allowed to decline and less service is employed. In our standard of living are included a host of items of accessories and incidentals that cannot be classed as necessities except in an artificial, psychological sense. A sound system of home economics must lead to the devaluation of these items in favor of a revaluation of foodstuffs. But one must be clear in the matter of relative values. Money can be wasted in buying high-priced foods for fuels just as easily as dissipated on calorieless beverages, amusements and cosmetics.

Meat Preferences

There are individuals who prefer a high meat ration. Eight-tenths of a pound of meat per day at an average value of 1200 calories per pound would represent 1000 calories. Incidentally, it may be remarked that the experiences of armies run to the effect that eight-tenths of a pound of meat per day is practically a maximum meat ration for the majority of men. One thousand calories in the form of meat added to the 1200 calories contained in the indispensable foodstuffs would equal 2200 calories, leaving 1400 still to be distributed among cereals, sugar, fruits and vegetables. Such a diet would be expensive from the standpoint of price per calorie, but is to be regarded as normal for active individuals in full health, whose tastes run in that direction.

People in Mediterranean countries are prone to consume relatively large amounts of cheese legumes and nuts, just as in Oriental countries legumes constitute a principal source of protein. These substances have a higher caloric value than meats. It would easily be possible for 1000 or 1500 calories per day to be taken in the form of nuts, beans, peas and cheese. These 1500 calories added to the 1200 calories of the indispensable foodstuffs, would leave still 900 calories to be consumed in the form of cereals, fruits and vegetables.

Such a ration, like the meat ration previously described, would approach high figures in protein intake.

Bread in France

Half the calories in the French diet are in bread. In this country the bread consumption probably does not cover 30% of the intake. If our bread consumption were advanced to 40% of our intake, the bread calories added to the calories of the indispensable foodstuffs would equal some 2600 calories, leaving still 1000 calories for meat, sugar, fruits and vegetables. An increase in bread consumption of 40% of the total calories of the diet would represent a pronounced cheapening of the diet in the price sense, without in the least suggesting a deterioration in the quality sense. Bread is not properly appreciated as a food in this country; it is too commonly regarded as a filler.

Perfection of agricultural technique acquires full meaning in diversification of the diet only under conditions of fluidity in transportation, credits and finance. Granted these, we may expect to see the production of foodstuffs more and more conform to the influence of price. Only in this way are the resources of the country to be properly utilized on the dining table of the family. We expect from consumers correct standards in the matter of indispensable foodstuffs and an open mind within the domain of choice of foodstuffs purchased on the basis of price. At present, the public does not buy wisely or efficiently the foods needed for fuels. The educational efforts of our schools and colleges have not yet penetrated into all classes of society. Custom, traditional practice and superstition still persist in opposition to economy. And finally, the public is deluged with a flood of motivated advertisements of foodstuffs, that influence quite as often in opposition to economic expenditure as in aid thereto.

Gradually the pressure of population on food supply may be expected to become more appreciable, although at present our standard of living is expanding so rapidly that of the pressure of population on food supply one observes scarcely a trace. Nevertheless, in the broad sense, relief from the pressure of population on food supply can be secured only through the simultaneous education of the producer of foodstuffs and the housewife in the direction of efficiency of operations. When I refer to the pressure of population on food supply, the expression is not used in the strict Malthusian sense as applied in the United States. We are not within sight of the limit of our potential agricultural resources even with the present imperfect methods of operation. From the standpoint of Malthus, one would have great difficulty in making out a case for conservation.

We have the largest per capita income in the world and the most costly standard of living. The efficient development of our standard of living, rather than defense against deterioration, is the object of education in the utilization of income. We have confessedly a considerable amount of malnutrition that is entirely unjustified from the standpoint of our resources and is fully amenable to procedures of relief based on education. For the present and the immediate future, therefore, our problem is correct management and utilization of resources rather than enlargement of resources.

Sandwich Costs

WHEN the "sob squad" of the modern newspaper is turned loose on any problem it can wring tears from turnips in telling about it. Recently the "sob sisters" of the larger newspapers have sat down to weep over the 20-cent sandwich in coffee shops and restaurants.

All they could get by way of echoes from the bread, which they interviewed as to its cost, was that 20-cent sandwiches simply had to be because of "high cost bread."

Now of course the facts have no special relationship to the story, when the "feature writer" of the "sobbing squad" is assigned to do a stint, but a baker who sells sandwich bread to restaurants, did a little figuring. Here is what he found:

The maker of the 20-cent sandwich gets for 12½ cents a "sandwich loaf" of bread that is 15¾ inches long. This bread, after both heels are cut off and discarded still makes 30 slices of bread, each one-half inch thick. The 30 slices make 15 sandwiches, each of which costs the sandwich maker four-fifths of a cent. Thus if the baker gave his bread away free to the sandwich man, and he passed the whole reduction on to the sandwich eater, the said consumer would still be paying over 19 cents for it. For the bread which he buys for 12½ cents the sandwich maker receives \$3. But he adds meat, butter and service, or fruit, butter and service. And carries the overhead of his sandwich shop.

These facts have been broadcasted from the American Institute to all press writers afflicted with the mid-summer madness of attacking bread prices on the score of high-priced sandwiches. The open season for this kind of writing is thus made highly hazardous.

Toast for Breakfast

HERE is a psalm of praise for toast. The point about it bakers should note is that it was written not by any bread man but by a *butter* man. It was sent out broadcast to the press and many papers copied it with and without credit to the Fairmount Creamery Co. No reader of this bit can doubt that the Fairmount company is doing its part for co-operative advertising.

Toast (either dry, buttered or in milk)

is truly and economically "The Great American Breakfast Good," worthy of encouragement and patronage by all friends of the farmer, the miller, the baker and the retailer.

Toast is the great American "hot bread" for breakfast that gives every member of the family the right send-off at the beginning of the day.

Everybody likes toast and it has a wide variety of uses. There is something about its crisp, substantial deliciousness that makes a universal appeal. Generously buttered, it has always been a favorite breakfast dish. Combined with other foods, its use may be extended into other meals.

Cinnamon toast is delightful for afternoon tea or Sunday supper; children love the crunchy goodness of toast along with their milk and stewed fruit, and a bowl of steaming hot milk-toast helps solve the problem of the invalid's tray.

Toast served under vegetables, game or meats adds much to their attractiveness and food value. Dip the toast quickly in boiling water and sprinkle lightly with salt. Peas, succotash, beans, spinach, cauliflower—in fact almost all vegetables are made more tasty and healthful if served with toast.

For making toast to the best advantage it is always well (if possible) to use bread at least twenty-four hours old; besides, this is economical.

A Sample Opportunity

I SHOULD like you to bear me in mind as being in the market for one of the graduates of the next class in your School of Baking. I will give him a position in one of our bakeries, and let him demonstrate his worth, and ability to bear responsibility. He will then be advanced as fast as he proves himself worthy of it.

HENRY STUDE,

Stude Baking Co., Houston, Texas.

Sinclair Lewis and Rotary

Two Interpreters of a New Industrial Conception in America

By HENRY STUDE

Of the Texas Bread Co., Houston, Texas

SINCE the world war a new spirit has come over American enterprises. One may observe it at the Standard Oil filling stations, where courtesy and a desire to oblige mark the conduct of almost every salesman. One finds that the salesmen work for a salary "and a commission," giving them some interest in the business.

One finds it, too, in the reports employees make of the way their employers "move their furniture" when they move these employees about from city to city, thus making such changes free from domestic devastation to those who must comply.

It is a spirit of co-operation, and an erasure of "bulldogism" from industrial directing forces. Now one hears talks before managers of the way in which "orders shouted in a gruff voice are half lost before they really get started." The gruff, hard boss who used to delight in getting to work before his men just so he could "give them the hard-eyed once over" upon arrival is going out in favor of the man at the head who can smile and keep his force willing and happy in that efficiency which contentment with one's job alone can give.

Sinclair Lewis attempted in his book "Babbitt" to ridicule this new spirit as Rotary exemplifies it. Henry Stude, a baker of Texas, sees in the new spirit of co-operation among leaders, the brightest light in the world today. Mr. Stude wrote his views for the Rotary Club of Houston. From all over America letters arrive at the American Institute of Baking, asking for notes to be worked up by bakers who have been invited to speak before Rotary or some similar club, for there are many of them.

All such inquirers may find in the article by Mr. Stude, printed below, a partial answer to their inquiries. Here he tells what the new force known as the "social conscience" is doing for the baking industry and for the country in which our American baking industry thrives.

George Ade delighted a good many of us years ago with his "Fables in Slang." Some of us enjoyed them on account of the language in which they were written. Others enjoyed them because they were so true to life. His portrayal of characters was so true we recognized each one of them. But the characters were static characters, they did nothing. We might draw our own conclusions and seek to avoid doing what they did.

Sinclair Lewis is today duplicating George Ade's fame. In his "Main Street" he drew the character of a small town, and in his "Babbitt" he drew the character of a small man in a big town, and this character is static. Babbitt was a booster. He belonged to the Rotary Club, to the Athletic Club, and the Conservative Party. He had ideals but they were only "skin deep." His opinions were gramophone opinions.

I consider it a function of Rotary to develop dynamic characters operating with a social conscience.

An able present day writer very aptly says: "The development of what is usually called the social conscience is perhaps the final achievement of civilization. Broadly speaking it is nothing more than the old familiar doctrine that a man does not live for himself alone."

Inspiration vs. Action

I am going to assume that a social conscience is composed of a moral conscience and a civic conscience.

Moral conscience concerns a man's relation with his God, and is the province of the ministry.

Civic inspiration concerns a man's relation with his fellow man, and is the province of Rotary. And the work of Rotary is like the work of the ministry, "purely inspirational." I am not unmindful of the danger and the difficulty of talking on a subject that operates through inspiration. You will recall the darky's criticism of religion: "It's too much Jesus and not enough Christianity."

Civic inspiration is apt to have too much talk and not enough action.

The Business Methods department of Rotary cannot lead each of you by the hand and say this is the method, this is the plan, this is the way. For Rotary by the very nature of its organization is a cross-section of all the trades and professions. But it can seek to inspire you to join, or form associations of your crafts to establish a higher ideal of service.

Specific advice to business men is apt to manifest itself in peculiar fashion.

You recall the story—it is quite a favorite in our business—of the baker who was standing in front of his shop with a very forlorn and dejected look. The minister happened by and asked what was the trouble. The baker replied, "that baker across the street, he's got all my business." The minister asked, "have you tried advertising?"

"Yes, but it didn't do any good."

"Have you tried fixing up the shop, and making something new?"

"Yes, it didn't do any good."

"Have you tried prayer?"

"No, never tried that."

"Suppose you try it."

"All right, I will do it tonight."

The minister happened by again in a few days and a change had quite evidently come about. The baker looked better and business looked better. The minister asked, "How's business?"

"Fine."

"Did you try what I told you?"

"Yes, tried it that same day and it worked fine. The feller across the street died the next morning."

Confidence Building

In your organization of your craft don't be negative. Don't form to suppress the illegal. Confidence can never be established by preventing the illegal. The illegal and the unethical are not synonymous. The illegal leads to the jail. The unethical is the path to the mud. The ethical is the paved road to public service. Ethics like all paved roads are the result of conscious, persistent, human effort. Don't organize to operate within the law, for the law is usually behind the times. Someone has said that Art precedes Science and Ethics is the Art of Law.

That this spirit of higher ethical standards in business, and a higher ideal of public service is abroad in the land is becoming daily more evident. The May number of the Annals of the American Academy of Political and Social Science was devoted to "The Ethics of the Professions and of Business." The Associated Advertising Clubs have a "Truth in Advertising Movement." You are familiar with the Better Business Bureau. I have told you before of the work of the bakers.

All are manifestations of higher ideals of public service.

A few years ago business was done on the principle of "Let the buyer beware." Then came A. T. Stewart and put a price tag on his merchandise. Then they put the firm's name on the tag and that was the beginning of "Good Will in Business." It is not the function of Rotary to create or enhance

the individual member's Good Will. We presume you had it—it was your qualification for membership in the Club. But it is the function of Rotary to inspire you and help you create a good will for the craft you represent; to strengthen you to resist the business temptations you meet in the process of making a living; to furnish—if you will—the necessary sand—so many of us lack sand.

Sand for Achievement

You know the story of the boy, the girl and the sand. The boy and the girl were sitting on the beach in the evening. She said, "Isn't this wonderful, isn't it romantic, the sea, the waves and the mellow moonlight?"

He said, "Uh huh."

She said, "Doesn't it make you feel as if you'd like to take me in your arms and kiss me?"

He said, "Uh huh."

She said, "Why don't you?"

He said, "I can't, I've got sand in my mouth."

She said, "Swallow it you boob, you need it."

Group Smugness

Rotary has another function and that is to prevent group smugness. To prevent those in any one group from feeling they are all sufficient. You've heard of the lawyer's contempt for the knowledge of those outside the profession; that engineering is the only real industrial profession; that if it wasn't for the farmers we'd starve to death; that labor won the war, and that business makes the world go 'round.

We must seek to suppress this braggadocio; to make them feel they are all a part of the whole; that the whole is greater than any of its parts. A container is always larger than the thing contained. A city—if you will—is larger than any club, individual, industry, trade, or profession in it.

So may we not define Rotary as a world wide movement manifesting itself through local clubs, whose members are chosen one from each trade or profession, each selected by reason of his belief in the spirit of "Service above Self." Meeting weekly and tending to quicken their business conscience and send them back to their crafts with a civic conscience which, combined with a moral conscience, will tend to produce a world living according to Matthew, 7th Chapter, 12th verse:

"Therefore all things whatsoever ye would that men should do to you, do ye even so to them."

A New Staff Member

TO determine ways and means of introducing more milk into bread to increase the nutritional quality of the loaf, Prof. Roscoe Hart Shaw, formerly Research Chemist, Dairy Division, U. S. Department of Agriculture, has been added to the staff of the American Institute of Baking.

For Prof. Shaw's use a new nutritional laboratory has been built adjoining the American Institute's main building on Fullerton Avenue, Chicago. Here test animals will be fed all forms of bread, and all combinations of bread and milk, to determine their relative merits from a nutritional standpoint.

The demand for more knowledge about nutrition has been forced upon the baking industry through a whirlwind of conflicting claims and pretenses of pseudo-scientists, as well as by genuine research workers. Some of these have made a religion of advocating one type of bread above another. Others have made foolish claims for one type or another of bread, which our research workers have entirely disproved.

Under the direction of C. B. Morison, Assistant Director of the Institute, Prof. Shaw will prepare data on bread quality

which will be capable of substantiation by any nutrition workers who may feel the results should be checked. The announcement that Prof. Shaw would join the institute staff brought many letters of praise for the Institute for obtaining his service, from dairy interests where he has been well known for many years.

Prof. Shaw graduated from the University of New Hampshire in 1897. He then spent two years abroad in attendance at the Eidgenn. Polytechnikum, in Zurich, Switzerland. His professional work as a chemist commenced at the New Hampshire Experiment Station in 1899. He performed research work in agricultural chemistry at the University of Wisconsin, the Kansas Experiment Station, the Nebraska Experiment Station, and the University of Missouri, until 1906. He then began a series of experiments on milk secretion for the University of Missouri and the U. S. Department of Agriculture, jointly. In 1909 he became Research Chemist, Dairy Division, U. S. Department of Agriculture, in which position he remained until last year.

Prof. Shaw has published extensively as a research worker, his reports having appeared in over twenty of the leading scientific and trade publications.

An Organizer at Work

IN ALMOST every section of the country some good organizer is taking hold of the bakery situation. Often the organizer is not a baker but one who sees the vision of what the baking industry may become, once it is united and friendly within its membership instead of carrying on in the old spirit of competition in anger, in fear, in hate, in suspicion, as well as in the selling of bakery products.

"On Monday evening I held a round

table with the bakers of Challette," writes J. H. Woolridge. "Every man was out 100 per cent strong. Not a slacker in the baking industry in this town. This is the first time the bakers have ever come together for a conference since 1918. Some have not spoken to each other in two or more years. Many had petty grievances to thresh out. Some went so far as to indulge in personalities. I acted as referee and decided all questions to the best of my ability. All left the meeting feeling good over the outcome."

That is work of the kind that faces up to the future. Woolridge will leave a blessed memory behind him, wherever he may go in the days to come. He is now visiting the bakers in all Potomac states and getting them into the harness for a long co-operative pull together.

Similar work in New England, in New York, on the Pacific Coast, in Pennsylvania, by devoted organizers, is having an effect that will be much clearer in the future than it now is.

A New Milling Spirit

IT HAS generally been held by the baking trade that while the bakers are the best customers the millers have, the millers have never done very much for the bakers except sell them flour. Whether or not this has been wholly the fault of the millers need not be stated, but it seems certain that the millers are at present in a mood to co-operate to the fullest extent with the bakers in an endeavor to increase the sale of wheat products. This opportunity for co-operation should not be lost by either party. It will not only help those immediately concerned in a direct way, but will indirectly benefit them in helping the general prosperity of the country.

—*The Canadian Baker & Confectioner*

The Industrialized Bakery

It Is Rapidly Replacing the Handcraft Plant of Older Days

By B. N. STRONK*

Industrial Engineer, with Arthur Anderson & Co., Accountants, Chicago

WHEN we talk of an industry we are apt to consider it more from what we see, from the buildings, equipment, and from the mechanical end. The growth and prosperity of an industry does not depend so much upon the buildings and equipment but almost entirely upon the effectiveness of the organization. We are living in a mechanical age but we want to remember that all machines have been conceived by man and that man is still the master of the machine. Therefore, one of the most important elements of the industry is the organization element. By that we mean the effective co-ordination of the abilities and activities of the various persons, who are part of the organization.

In order to give you a better idea of an organization and how it develops, we will trace it from the beginning. As you know, practically all businesses have grown from a very small unit, from a one man affair to large enterprises, but we want to remember, that even if the business consists of but one man, all of the industrial functions are centered in that one man, just as well as they will exist subdivided later on after he has a hundred or a thousand employees under him.

In developing this we will start out with the one man proposition. For the sake of discussion we will say that Bill Smith is starting in a manufacturing business. Naturally the first thing he did was to conceive some product that he wanted to make. So the first function of the business which became in evidence is the DESIGN function.

The next thing that Bill had to do was to get equipment so he could manufacture the result of that design, and the EQUIPMENT function came into existence. The next thing Bill had to do was to buy material so he could make the product of that design with the equipment. Then the function of PURCHASING came into existence. It is probable Bill started out with equipment and material and made the first things himself, but naturally the function of MANUFACTURING was there.

When he completed the manufacturing he had to sell the product and the SALES function was there. In the meantime, while all this was going on Bill perhaps kept some few memorandums on his money matters in a crude way, and what we might call the function of FINANCE came into existence. Now we will assume that Bill went along and he made his first unit of product, sold it through his sales function, received money for it and more orders. He suddenly found that he himself could not do all the manufacturing so he engaged one man. The first thing he did then was to cast off various functions. The first function he partly cast off was when he engaged one man to help him MANUFACTURE, and he possibly did all other things himself.

Manufacturing developed further and he gradually cast off this Manufacturing function entirely. The first thing he did was to engage one man—now he needs more—so he probably hired more help, a few assistants under one man. His sales were good and gradually more men were hired. The next thing he cast away from himself was the function of the OFFICE and perhaps he

*In an address to students of the American Institute's School of Baking.

engaged someone as a combination bookkeeper, clerk and office man.

Manufacturing began to get larger and larger and perhaps he divided this up and had more workers under each man. They were now using a great deal of machinery and the function of MACHINERY MAINTENANCE was created, as he did not want the operators to be bothered with machine repairs. He engaged a master mechanic and the function of REPAIRS AND MAINTENANCE came into existence. With all this activity going on, it depends now on how Bill was inclined, if he was naturally inclined towards sales, he would keep sales as his pet function and devote most of his time to sales. Because of all of the buying that was necessary he cast away from himself that end and started a PURCHASING DEPARTMENT. What happened about now was that he found that he was selling a great many devices and he probably found it would be a good thing if he could create others. So he engaged a designer or perhaps a draftsman, and he designed more products. He had a man to buy the material, he had the manufacturing going, and perhaps, with the new design in existence, the sales activities were enlarged and he cast away from himself the function of SALES. Now let us see what happens in some of these functions. Certain things have been taking place in the office. He incidentally found that he had to install a bookkeeping system and he probably engaged a bookkeeper as assistant. He may have had so many sales that he commenced a credit and collection department. Another thing that is becoming important is to know what it costs him to make the product so he established the function of COST FINDING.

The repairs and maintenance section commenced with one mechanic and he finds he cannot do all the work alone so he engages more help, janitors, night watchmen, electricians, carpenters and mechanics, all whose duty it is to keep the equip-

ment and plant in first class condition. In the meantime the designer becomes a designing engineer and he needs help. If it is an article that requires a patent he might have an expert on patents.

There will be a very large growth of purchasing. This purchasing department will no doubt develop with various functions and activities divided. In the manufacturing department a great many things take place. He found that they had to distribute the orders through the shop and he engaged an order clerk to route orders. He found tools had to be designed for machines and he started a Tool Division. After that he probably found that he needed an employment man to hire help and he commenced an EMPLOYMENT DIVISION.

Now we can see that Bill Smith started out with one man, knew him personally, worked with him on the bench. He knew him—treated him white. Relation of boss to employee did not exist. When this business branched out there was not so much personal contact between Bill Smith and the employees, and we now come into the section of industrial relations. Bill Smith wants to treat the men he now has in his employ just the same as he did the first man. He wants to have co-operation in his organization, so he commenced to study the question of "organization." The type of organization that we know of mostly is what is known as the "line-type" or military type, the type where authority passes down in a straight line. However, the present tendency of development is what is known as the "functional type" of organization.

The principle of this is that the activities of the business are divided into units with an expert at the head of each group. In the meantime Bill Smith analyzed his business and found that he had owners or stockholders in the business. We all know in corporate businesses that the stockholders elect the board of directors by vote, so we have the board of directors. We also know that

in corporate businesses the board of directors elect officers of the company, and usually as officers of the company we have a president, vice president, secretary, and treasurer. As far as corporate functions are concerned the president is not the boss over the vice president, secretary or treasurer. They are individually responsible to the board of directors and not to each other. In general, in every organization there is a boss who is held responsible for all activities, known as the general manager. The president may be general manager and the vice president may be his assistant, or there may be appointed by the directors a general manager who is not the president of the company, but in this particular case we will consider the president as general manager, so that all the activities are co-ordinated by him. We find that we have the function of purchasing in charge of the purchasing agent and that purchasing agent may have his various clerks and record keepers. We have the function of finance, generally in charge of the treasurer of the company and if it is a large organization, we divide that into two units, large problems and policies are under the treasurer and smaller problems under a comptroller, under whom we have the office branch in charge of an office manager. In the average industry, under the office, we have the bookkeeping department, the credits and collections, order department, cost accounting department depending upon the type of industry we are in. We next have the purely manufacturing division which is in charge of a factory manager. He will have probably two or more operating superintendents; each operating superintendent will have under him a number of foremen and each foreman will have under him a number of workers. We also have a material section relating to materials, under which are stores clerks and stores records, the receiving of material and shipping of mate-

rials. There would be an inspection division responsible for quality and a repair and maintenance division. There would be a division which would be the shop office, properly known as a planning department. We would have the sales or marketing division in charge of a sales manager, who would have under him the function of advertising and the function of distributing, which might be divided into districts with district sales managers and individual salesmen, depending upon the nature of distribution. That is, in general, the principal development of a corporate organization.

Things to Remember

There are several things we want to remember. The first step is the subdivision and co-ordination of activities. In the development of an organization there are certain principles which must be followed. One principle is "lines of authority and responsibility must be definitely drawn and defined, as without authority there is no responsibility and without responsibility there should be no authority." If a man is held responsible for results he must be given the necessary authority to produce results.

The second principle is that "activity should be so divided that no high priced man does the work of any lower priced man." In furtherance of that principle we have what is known as the "exception principle." If the activities and results of division are normal it is not necessary to disturb the general manager. It is only when results become abnormal that these must be brought to his attention.

The third principle is what might be known as the "three position plan" of organization. By the three position plan we mean that everyone in the organization really holds three positions—of worker in his present position—of teacher of position next lower—and of student of the next higher position. What we mean by this is that

understudies should be developed on all important functions.

Another important principle in the operation of an organization is "the authority to issue an order involves the responsibility to see that it is properly executed." The application of this principle eliminates certain individuals who are apt to pass the blame to others.

In order to co-ordinate the activities of various groups in an organization and to visualize the activities we design organization charts. There is generally a normal number of employees and a normal amount of dollars of expenditure for each one of these functions, so that if a manufacturer has an organization chart of this kind which pictures all functions of the business by comparison every month or so, he can find out whether or not the number of employees has become greater or expenditures have increased. Also in order to co-ordinate the activities and to take care of the training of new employees, these activities are described in detail so that in case, for example, the head of the purchasing department should leave, all requirements of the job and the requirements of everyone under him have been carefully written down and the effect of a man leaving the organization will not be so intense, as if a new man would step in and have to get acquainted with the system first. Such instructions are known as "written standard practice."

Distributing the Product

In the baking industry the function of distribution is of vital importance because of the relative cost of distribution. Therefore the development of distribution is more noticed in the baking industry. In the baking business this function is headed by a sales manager. Under the sales manager we would have the function of advertising and perhaps an assistant sales manager, if the industry is large enough. There would

probably be salesmen or solicitors of new accounts. There would be a delivery system which would be divided into divisions with division managers. Under such division manager we would have the various routes with the sales drivers, as many as it would be logical for a division manager to operate. Then in addition to the direct method of distribution there probably would be special delivery division.

A very important function in the baking industry is that of purchasing. We would also have the function of the office. The bookkeeping department would be relatively small if the sales are a large percentage in cash. In other cases where the products are sold on credit, the bookkeeping department would be very large. Then we would have a cost accounting section, order section, statistical section and cashier's section. But as a whole the office section of the average bakery distributing only in the city, would be small compared with other industries.

Manufacturing Section

We have the manufacturing section which would have various divisions. We have the repair and maintenance section. We have the material or store section. The repair and maintenance section would deal with the janitor or sanitation service in this case. The strictly manufacturing division would perhaps be divided into a bread division and a sweet goods division. Under the material division would come flour blending which is really an operation, but would be under the material section work. Under manufacturing we would also have shipping. We would have a delivery equipment superintendent who would be responsible for the upkeep of the delivery equipment and in charge of the barns and garages. The baking industry being related to the chemical industry, it becomes necessary to develop a central staff of some kind and we will call

this the research department. Under this research department would come the laboratory where analyses of material are made and if this company wishes to improve and control its processes we would have a division which would deal with research and standardization of process control and production efficiency and through its activities the performances of every group would be compared with standards. If a control system is in existence which compares results of these various activities and shows by comparison whether one or another is abnormal then it would be the duty of the research division to find out why it is abnormal and effect remedies.

Conclusion

In conclusion we might state that it is possible through scientific subdivision of work, the selection and training of proper individuals for each subdivision, the proper co-ordinating of the work of all divisions and the definite establishment of lines of authority and responsibility, to develop an effective and elastic organization which will be able to expand naturally and without pressure as the business expands. The simplest definition for scientific management is: "The dignified team-work between employer and employees," but in order to make this "team-work" possible it is the duty of the management to see that the organization develops along sound lines.

Crackers—and a Bread Man

DO ANY bread or cracker bakers of today remember away back when the great west received huge barrels of crackers on freight wagons from Davenport, Iowa, and points east?

Davenport now sports a big wireless station and is graced by signs, put up by the local Rotary Club. These proclaim that Davenport is the point "Where the West Begins." Also Davenport is the home of

William Korn, president of American Bakers Association. It happens that as a baby watching a cracker brake at work furnished his earliest recollections. Then he saw the barrels of crackers loaded onto the "prairie schooners" for their long journey to the Rockies and beyond. The writer, it happens, retains among his earliest childhood memories a memory of fighting with other boys for the cracker barrels as they were emptied on the west coast of the farthest Rocky Mountain spurs. Their hickory hoops were especially desired by Rocky Mountain youngsters for bow-and-arrow manufacture.

In a letter written to be read at the convention of the Biscuit and Cracker Manufacturers' Association, President Korn outlined some of the ways cracker baking in America has changed, while his own plant has grown from a "basket" plant to the most modern plant in his home community. Here is the story as he sketched it:

"A few days ago, I reminded my old father of the time when he used to make crackers by hand, and he was surprised that I could remember that far. It was in 1871 or 1872 when he gave up making crackers by hand, and I was then five years old.

"I can see him today peeling crackers out of an old-time hearth oven and dumping them into a wash-basket, which was sitting right under the mouth of the oven. I remember that I used to pick up those crackers that fell alongside and as many as I could not eat would go into the basket. I can remember how the men used to turn both the brake and the cracker machine by hand.

"Of course, there was a large flywheel which helped to keep up the speed when once they attained it. I also remember how they used to knead the dough after they had mixed it. The cracker dough was a very, very stiff dough, so the same was placed on a platform which was built in the corner of the shop. A long pole was fastened in the wall over the corner of this platform, and

one man would raise and lower this pole over the dough and in this way knead it until ready for the brake.

"I remember straddling this pole and getting a free ride. Davenport, at that time, was one of the frontier towns and a good many of the old pioneers who were headed for the West would stop off and lay in a supply of crackers instead of bread. The crackers were packed in barrels only. There were four bakers in Davenport at that time who were making crackers; however, they made them only one or two days a week. They made a soda cracker; a smaller cracker which was called the oyster cracker; another, a little larger than the oyster cracker, which was called a butter cracker; and then the sweet cracker. Four kinds were all that were made. In 1886, I worked again on crackers in the old William Schmidt shop on Clybourn near Larrabee Street, Chicago. Of course, at that time cracker baking had become modernized, but not the same as it is today.

"One of the cracker bakers who followed my father in the old days was the father of Oswald Schmidt, who was one of the directors of the Biscuit and Cracker Association. Oswald Schmidt took charge after his father died when he was quite a young man, and my father used to point out Oswald Schmidt to me as a model business man and from him I received many inspirations."

Hermit Bakers

AN OBSERVING person signing the initials "S. M." has been around about among bakers and has furnished his impression of them to *The Retail Baker*, edited by George Ament, in New York City.

What "Observer" has noted seems to apply to every baker—the biggest with the smallest. It is reprinted here for the special notice of those who think there must be factional lines within the baking industry instead of one big organization in whose in-

terest all participants will "check their tomahawks with the coat girl" on entering meeting rooms.

"It happens quite often," writes S. M., "that I meet bakers doing business in large cities who are so impressed with themselves and their own greatness that they think they can paddle their own canoe. As far as their colleagues are concerned they live as regular hermits—in seclusion, you may say, in the deepest forest. When another baker calls on them they are frightened. Fellows of this kind are like the hermit, not representatives of the human race, but simply specimens of peculiar make-up.

"It is different with the baker who is organized. He is respected as a representative of his trade and is looked up to by all members of his community.

"There are, I regret to say, a few wise-heimers who are no better than the hermit and deserve to be left alone, but this is not advisable, because when left alone they retard the advance of the more enlightened. My advice is that of the Food Administrator of past days: "Organize; join organizations where they exist and form new ones where there are none."

A World's Bread Congress?

ARE BREAD bakers any less interested in world conditions affecting their industry than dairymen? At Washington, D. C., October 2, a World's Dairy Congress will open its sessions. Government departments will co-operate, and twenty-three American associations allied to dairying will help in the entertainment of foreign visitors. This will be the first world conference on dairying held in the United States, and it commands attention from all for the simple reason that this industry has its roots in forty-seven billion dollars' worth of American farms, producing annually forty-four billion quarts of milk. Our own industry would be no less impressive if marshaled upon such an international horizon.

Books for the Baking Laboratory

SELECTION AND PREPARATION OF FOOD IN DIABETES. By Archie H. Beard, M. D., Assistant Professor of Medicine, University of Minnesota; Margaret Mumford Neale, M. S., Assistant Professor of Home Economics, University of Minnesota, and Alice M. Child, M. A., Assistant Professor of Home Economics, University of Minnesota. Published by the Woman's Community Council, Minneapolis, Minn., 20 pp., 1923.

The Women's Community Council of Minneapolis have performed a valuable public service in publishing this bulletin of information for diabetic patients. The bulletin is intended primarily as an aid in the instruction of diabetic patients who have little or no knowledge of the composition, properties and uses of food. Failure to secure the co-operation of patients in group classes in the Diabetic Clinic of the University Hospital Dispensary, resulted in the effort of the Department of Medicine and the Division of Home Economics of the University of Minnesota with the co-operation of the Social Service Department, to work out plans so that the proper selection for a diabetic, by a dietitian under a physician's supervision might be given. The available literature upon the selection and preparation of food for the diabetic was not found to be sufficiently elementary to meet the needs of these patients, and as a result the bulletin was prepared to assist in their more intelligent co-operation.

Diabetes, its nature and symptoms, and methods for determining the sugar tolerance of the patient are outlined with a simple exposition of the modern dietary treatment of the disease. The recently discovered preparation known as insulin is also briefly discussed in connection with dietary measures.

Several pages are devoted to the fundamental discussion of foods and their properties, carbohydrate content of common vegetables and fruits, the calculation of fuel value, and the ratio of glucose to fatty acid.

The remainder of the text includes general health suggestions, fast days, diet for fast days, and the preparation of thrice cooked vegetables.

A useful table of food values follows which indicates the number of grams of protein, fat and carbohydrate in 100 grams of many common foods, with an explanation of the use of this data in planning a diet to meet the tolerance of the patient.

A final portion of the bulletin is devoted to a

sample day's menu for the diabetic and many recipes for the preparation of diabetic foods for use in such selected menus. A surprisingly large number of recipes are given, which provides an opportunity for using a considerable variety of cooked foods instead of the usual monotonous diabetic regimen as ordinarily chosen.

Each recipe has been calculated in grams of the foodstuffs present in the cooked product, which enables the patient to readily calculate the quantity of protein, fat and carbohydrate present, and the total fuel value.

The bulletin represents much work on the part of the authors, especially in the preparation and calculation of the recipes, and should be greatly appreciated by all who are interested in the purpose for which it is intended. C. B. M.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Vitamins and Nutrition. M. J. Lewi and H. E. Dubin, N. Y. State J. Med. 21, 269-70 (1921); Abstracts Bact. 5, 346.—A resume. H. G.

Flour and Dough of Regulated Hydrogen-ion Concentration. C. G. Harrel, U. S. 1,429,504, Sept. 19. Different varieties of flour are tested and blended to obtain a mixture having a definite pH so that the required period of dough fermentation in bread making or the like can be accurately determined, provided all other variables remain const. Tests of wheat are also proposed for blending to obtain a flour having the desired properties. C. A. Vol. 16, No. 22, November 20, 1922. Page 3987.

Relation Between the Nutritive Values of Bread and Macaroni, and the Restorative Value of Certain Fresh Vegetables. G. Petragrani. Rend. d. adunanze d. accad. med.-fis. fiorentina; Sperimentale 76, 247-55 (1922). Pigeons placed on an incomplete diet show a greater resistance to its effects if they have at some previous time been on a more completely devitaminized diet for a long period. The ordinary medium-grade flour, from which bread and macaroni are made, has been deprived of about two-thirds of its vitamins. Boiling for 10 min. in salt H₂O caused a further diminution. Bread showed a higher nutritive capacity than the flour from which it

was made, owing to the raising process. Vegetables and fruits are classed in the following decreasing order of protective value: peas, cabbage, lettuce, radishes, pears and plums. C. A. Vol. 16, No. 23, Dec. 10, 1922. Page 4255. M. H.

Maturing Flour. 11. F. L. Dunlap. Chem. Met. Eng. 27, 934-7 (1922); cf. C. A. 16, 3136.—A description of the commercial equipment for developing the optimum baking capacity of flour through treatment with a mixture of Cl and nitrosyl chloride. Its application in milling technology is discussed. RUTH BUCHANAN.

Action of Shortening in the Light of the Newer Theories of Surface Phenomena. Washington Platt and R. S. Fleming. Ind. Eng. Chem. 15, 390-4 (1923).—The physical effect of shortening on the structure and physical properties of the dough and finished sugar cookies was studied. In this type of product shortening acts by interposing itself in layers between the particles of dough, thereby preventing the formation of one continuous mass. This structure can be observed with the microscope in both the dough and baked product. Plasticity of different fats at the temperature of mixing (about 80° F.) is an important factor in causing differences between their shortening power. The shortening power for plastic fats is determined by the plasticity and unsaturated glyceride content and by the latter for fats not plastic in the dough. This is in accord with the present ideas regarding orientation of molecules and the energy relations at interfaces. The parallelism between shortening and lubrication is pointed out.

H. A. LEPPER.

Food Adulteration and Its Control in a Large City. R. O. Brooks. Spice Mill 46, 512-15 (1923).—The duties and operation of a municipal food inspection department are outlined. Sophistications detected in 117 foods are listed.

C. W. TRIGG.

Investigation of a Technical Separation of Grits and Flour for Tariff Classification. J. Buchwald. Z. Ges. Getriedew. 14, No. 5-6, 45-58 (1922).—Screening methods were used to separate flour from grits, products of the flour being duty-free under the present tariff. 50 g. samples of the product to be tested were placed on a No. 3 screen, 23 mesh to 57 cm. and sifted about three minutes or until sifting was complete. The residue was weighed and results of the part passing the screen and residue expressed as percent of total sample. For wheat

flour 75% must pass the screen, for corn meal 50%, and for rice food flour 25%. Results on domestic and foreign milling products showed the following to be classed as flour: wheat flour, hard wheat grits, corn meal, fine cream meal (corn), rice powder, rice food flour with powder. The following are classed as grits: soft wheat grits, American hard wheat middlings, corn grits, cream meal (corn) and rice food flour without powder. F. A. CAJORI.

The Influence of Moisture Content on the Ash Value of Flour. S. J. Lawellin. National Miller 28, No. 1 (1923).—The ash content of any particular flour is inversely proportional to the moisture content. RUTH BUCHANAN.

Report on Cereal Foods. C. H. Bailey. J. Assoc. Official Agr. Chem. 60-3 (1922).—Two methods, details of which are given, for determining of fat in baked cereal products, were studied by collaborators. The results justified the adoption as tentative of the method proposed by C. R. Smith. Add 10 cc. alcohol, 2 cc. concentrated NH_4OH and 3 cc. H_2O to 5 g. of ground sample in a 200 cc. flask. Boil 2 minutes on the steam bath, cool, extract with 3 25 cc. portions of Et_2O , kneading with glass rod. Decant Et_2O into a 250 cc. beaker, draining the last as completely as possible. Add another 15 cc. portion of ammoniacal alcohol solution to the extracted material, disintegrate with a glass rod. Repeat the boiling and extraction. Evaporate the combined Et_2O extracts to dryness and extract the residue five or six times with a mixture of petroleum ether and Et_2O (15 cc. of each). Collect the extracts in a dish (do not filter), evaporate dry at 100° and weight.

H. A. LEPPER.

Studies on Wheat Flour Grades. III. Effect of Chlorine Bleaching Upon the Electrolytic Resistance and Hydrogen-Ion Concentration of Water Extracts. C. H. Bailey and Arnold Johnson. J. Assoc. Official Agr. Chem. 6, 63-8 (1922).—A patent and a clear flour with 0.43 and 0.84% ash, respectively, were studied. Laboratory bleaching with 20 cc. Cl per 100 g. increased the specific electrical conductivity of the H_2O extract of the patent 0.48 and of the clear 0.73 ($\text{K}_s \times 10^4$). On the patent this is equivalent to 0.045% of ash when unbleached flours of varying ash content are compared. Same treatment changed the pH value of the patent 0.34 while the clear changed only 0.17 because of its higher buffer action. Compared bleached samples gave similar results.

H. A. LEPPER.

A Scoring for the Unscored

AN OLD MAN, bending over a roller-pin at a sweet-goods bench, looked up with a smile when he learned that a visitor was from the home of the organized baking industry.

"I once owned a bakery," he said. "I would own it now, only I was used up. I got rope. Rope infected my bread till the stores all sent it back. It piled up in the bakery. In those days we knew nothing about rope, or how to cure it. We tried everything—but my trade was all killed."

And the old man went on with the rolling-pin. He was working for another baker now. Yet he smiled in glorious pride that the industry now had conquered the rope disease that had conquered him.

The machinery in the shop where he was working was mostly torn down. The bakery was being rebuilt from cellar to roof. Two graduate students of the American Institute were in charge of the rebuilding operations. Cork insulation was going into the floors and walls of one room—to get fermentation control *without guesswork*.

Refrigerating rooms were being built. Overhead trolley systems for dough troughs were being installed to lessen hard labor.

Here was our Institute at work—out in the industrial world where its graduates knew its lessons—and knew what the background of good bread must be. The old baker at the bench, rolling away with his rolling-pin, left a vivid memory on the visitor. And so he came back to the American Institute.

"We fear our bread has rope," was the first letter that fell under his gaze on reaching home. "What shall we do?"

"Send us some samples and let us incubate them for rope," was the message that

went back *by wire*. In these hot days, a rope epidemic is nothing to flirt with slowly.

The samples arrived. They were incubated. Rope appeared strongly on the second day. Samples of the flour used were incubated. One particular lot of flour—it was corn flour, not wheat flour—baked out rich in rope bacteria. Again the telegraph wires carried a message—"eliminate the offending flour, and, as a double preventive, ferment the doughs a little longer and add three pints of four per cent vinegar to each 100 pounds of flour."

Bread samples continued to come. There was no more rope. The baker of 1923 who *used his association* was not eliminated, as his aged predecessor had been. So we, too, could smile in a bit of the same pride that our aged friend had shown as he saw new days overwhelming old ones.

Too Much Science

There can be too much science in a bake-shop, of course—unless the scientist is thoroughly grounded in practical baking methods. One such scientist, in search for acidity control, destroyed all flavor in his bread. He did not comprehend the limitations of chemistry, as our service experts do when they make the baking test the one supreme evidence of what's in flour and what's in the baking process that should be corrected.

When A. W. Landstrom, of our Service Department, received a wire from the Pacific Coast that rope and mold were giving trouble, he was able to wire back such complete directions that samples cleared up in two days. This is the way the service goes. Why not get your full share?

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BAKING TECHNOLOGY

*A Journal of
Applied Science
in Baking*



*Published by
The American Institute
of Baking*

Vol. II CHICAGO, ILLINOIS, SEPTEMBER 15, 1923

No. 9

Our Industry That Is to Be

IN THE rapidly expanding baking business, how long will it be before folks will be saying, one to another, "Do you remember away back when the miller was the proud brother who looked down on the baker industry, and the baker was the proud brother who looked a way down on the salesman of bakery supplies, and the meat man thought he had a competitive fight with the baker, and the milk man thought he was somebody far apart from either of them?"

The time when all this came to a close was at French Lick, Indiana, September 10 to 15, 1923. To those who did not at-

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tend that great super-convention words can never give the picture of the good accomplished for the baking world.

Some found it a strange world—especially members of the allied trades. They had thought of conventions as places where they, as salesmen, came to meet bakers, as possible buyers. Instead of finding things as they used to be, they found heads of the milling industry there as well

as their salesman. And they had not come to think of the problem of selling flour to bakers.

They had come to think of the problem of selling bread as a means of selling flour.

They had come to put their shoulder to the wheel, and expand the market for their flour, as represented by its baked products.

In quiet corners one heard them talking with yeast men and with leaders of the baking industry. What about? About \$100,000 or \$1,000,000, and what a fund, raised by them jointly, would do just in popularizing and expanding the regard of the people for wheaten foods. Never before had the millers come to a bakers' convention in force. Never had they visioned a task for themselves to perform in what they had always considered the bakers' world, of which their own was a world apart.

When the registers of the hotels were examined they revealed that nearly 600 convention delegates had registered at the French Lick hotel, over 200 at the West Baden Springs hotel, and over 50 at the Homestead hotel. Besides there were substantial groups at the Witsman and the Windsor hotels, and a large number motored in for one day stays.

What a mighty outpouring this total made! It meant that the most important moments of the convention were not in the great convention hall floor, but in quiet little group meetings where problems that had never before been tackled were threshed out.

At one of these meetings all the association secretaries got together and decided to interchange information of all kinds, "because the problem that one association is fighting today is the problem the next association must fight tomorrow."

The Grocer's View

At another such meeting H. C. Balsiger, who has given his life to thinking out the problems of the retail grocer, told how these problems lapped over into the life of the baker and affected the baker's wel-

fare. He told how the alert, consciously alive, baking industry through its National headquarters had tasks to work out in co-operation with the organized grocery world, with its own National headquarters as the point of contact.

As fine a contact was made between the baking world and the grocery world as was made between the milling world and the bakery world.

And this was only the beginning of the story.

Meat Men's Co-operation

At another quiet little meeting, Charles W. Myers appeared and spoke his mind as to the relationship of meat and bread. Do you remember away back when the meat interests were reprinting attacks on bread by Dr. Woods Hutchinson, in which bread was dubbed with the meaty epithet, "that most unwholesome cereal." Instead of telling us any such story, Mr. Myers, spokesman for Armour & Co. and the American Institute of Meat Packers, told us the simple fact that meat must be carried to the table—by other foods, and that bread was the best carrier meat had ever known. He looked forward to the day when children in school would be encouraged in eating recess sandwiches—a bit of meat between slices of bread. And when there would be an after-school sandwich as well, with bread making the outlet for the meat.

Mr. Myers also called attention to the way the meat people had backed their new faith with new deeds. He exhibited the fine posters showing meat served with bread. Here again was an old dust storm sprinkled down to rest.

The golf course itself seemed a place for doing business more potent than the assembly room. Men were dragged into four-somes who had come with chips on their shoulders. They returned with scores on

their score cards that showed the old scores between them had all been wiped out. They had found one another as human beings and friends.

The Electrical Display

The electrical people were on hand. When it came to looking over the exhibit of the American Institute of Baking, it seemed for a time that this was an electric man's convention, not a bakers' convention. And that, too, was necessary. Bakers had found that they must invade the electrical industry and gain its co-operation in filling American homes with toasters before the bakers could make toast the common breakfast food of these homes.

Toasters—developed to perfection in form—were there giving steadily the results the housewife looks for. The electrical men learned for the first time what a great industry they are co-operating with and how alert and earnest its leaders are in visioning their problem as part of our national life—not as an indoor problem of an individual bake shop. And the makers of the toasters were there catching some of the fire and spirit of the great convention, so that their interest can never burn out until the hope for co-operation between bakers and electrical manufacturers has been fully accomplished.

When President Korn brought his gavel down for the last time at the end of his splendidly progressive administration, he expressed the wish that more bakers might see their own business as part of a great national service. "The glory of God is intelligence," he stated, quoting a prophet, and "Without vision the people perish," he quoted again from an ancient seer. He wanted to know why bakers so often ignored the pathway of progress to wander off into practices of premium-giving and quarrels that led only to their destruction.

And he spoke at last for the next great

development of the industry—the development of the bread course in the School of Baking until it takes in "everything from pretzels to pies." He spoke of the addition to the Institute building where a sweet-goods course could be put in and of the \$30,000 that would build and equip this addition in time for the next baking course. He saw here something that would bring the small baker along the right pathway, that would make him feel his oneness with the wholesale bread baker. Very probably he dropped the seed of an idea that will grow into fulfillment as the autumn season passes.

For Strong Locals

Raymond K. Stritzinger, who picked the gavel up, proved no less a leader for progressive policies than William H. Korn had been. Like President Korn, he had carried a bread basket on his arm in his youthful days. Like him he had progressed by ever being ready to try new ways in new days. And like him he voiced a belief in the little baker and the little bakery as the hope of the industry—its hope through their changing and shifting with the times and surviving in new eras where old methods would be sure to spell death. Both wanted the local associations and the state associations to grow as the foundation for the national.

Then there was another group at the convention. It is probable that in another fifty years the people will look back at the work of Dr. E. V. McCollum as the most revolutionary in modern life since the work of Louis Pasteur.

Dr. McCollum's Help

True teacher that he is, Dr. McCollum sat among the bakers after his masterful address on nutrition, and spoke freely in answer to all who came to question him about nutrition. Of the two great bodies of modern scientific knowledge about the

sources of health, Pasteur gave us the "open sesame" to the first—bacterial life—and spent his life defending his new theory against its detractors and deniers. McCollum has opened up, with colleagues like Funk and Mendel, another great vein of human knowledge and men are now rushing forward to mine it. Meanwhile McCollum broods over its ascertained facts, defending them from assault, looking far and wide for enemies, and encouraging all who follow vitamin research enough to comprehend it.

It was a treat to have him at the bakers' convention. With him was Eldred of Stanford University, thus linking the great research university of the western coast with the great research institute of the eastern coast—Johns Hopkins University.

Women Converted

And in addition to all these were the women. The women's luncheon was a convention triumph. Women leaders came there who had taught home baking all their lives and did not believe in factory-made bread. They heard technicians discuss bread ingredients with a thoroughness no housewife had ever dreamed of. They saw the constituents of the modern loaf analyzed as they had never been listed in a kitchen. They heard of sanitary standards worthy of the best of homes. They were "sold and astonished" with the proposition of bakers' bread.

Altogether here was the longest and best thrust the organized baking world ever made to breaking through inhibitions and opposition to the growth of the baking industry. Pioneers rolled many rocks out of the way. Now all that remains is for the bakers of Texas and Maine and Nebraska, Oregon and Virginia, and all their associates to "follow through." The Allied Tradesmen, keenest eyed of men, saw the new vision and subscribed in a

body to BAKING TECHNOLOGY—to get the broadcast news of all things all must know in common who are to work together for our industry that is to be.

Replacing "Old Man Grouch"

THERE is one thing which every retail baker might profitably add to the equipment of his store without a cent of cost to himself—and that is, a little cheerfulness. It is considerably more pleasant to enter a bakery where everybody is all smiles and cheerfulness than a store where "Old Man Grouch" seems to be perpetually seated on his throne. Both mental attributes are catching. If the baker and his sales force are of the happy kind, his trade, too, will be imbued with the same spirit, and make doing business easy. On the other hand, if everything is gloomy in the store, the customers are likely to become grouchy and cranky, and very likely will forget that extra purchase they perhaps intended to make.

—An Editorial from BAKERS WEEKLY.

A Plea for Knowledge

WHAT a splendid thing it would be if all young mothers could have access to Dr. Alonzo Taylor's table of nutritional values in your August number and also his conclusions on the subject. I wish you would send me half a dozen extra copies. I wish to send them to friends without disturbing my own file.

ROBERT DEWAR, Kansas City, Mo.

I have read six copies of BAKING TECHNOLOGY, and several times, while reading some very pertinent article, I could not help wishing that all the bakers in my territory were subscribers.

—HARRY LOVALD, Inspector, Food and Drug Dept., State of South Dakota.

The Food Research Institute

Why the Country's Bakers Must Co-operate with It to Get Results for the Industry

By WILFRED ELDRÉD*

Of the Food Research Institute of Stanford University, California

AT YOUR Chicago convention two years ago, the Food Research Institute, then in its infancy, was introduced to you by Dr. J. S. Davis, one of its directors. Dr. Davis outlined some of the possibilities of economic research in the general field of bread distribution, and raised the question whether you would co-operate with the Food Research Institute in some studies in the economic problems of the baking industry. Your association voted favorably and pledged its support. Somewhat later your Board of Governors appointed a committee on economic research to counsel with us in connection with our studies in the baking industry. Today I am here, by request of your convention leaders, to tell you briefly what the Food Research Institute has done and is doing that concerns the members of this huge and far-flung industry.

In accordance with an early decision of the directors, the studies of the institute are for the present concerned mainly with problems related to wheat and wheat products. The decision to concentrate upon wheat and its products was made partly because of the outstanding importance of wheat in the national and international food supply, and partly because the time seemed especially opportune for productive investigation in this field.

Within this general field the institute is carrying on some intensive studies, the results of which, it is hoped, will be of value to American producers and consumers in general, and specifically, among others, to

those engaged in the manufacture and distribution of flour and bread. I do not mean by this that the institute attempts to act as business adviser, for that is not our province. Our job is rather to study the problems of food production and distribution from a broad national viewpoint—to assemble significant facts, to interpret them, and to make some contribution toward a clearer understanding of the course of events and the outlook for the future; but to some extent this involves studies looking toward improvements in commercial methods and the elimination of waste in the food industries.

Before considering the part of our work that has to do particularly with the baking industry, I may mention in passing some other studies which have indirect interest for wideawake bakers. We are studying wheat from the standpoint of prices, production costs, supplies, consumption and trade; trying, among other things, to understand the reasons for the wheat farmer's present predicament and to see the way out of it.

In this connection one of our directors, Dr. Alonzo E. Taylor, recently presented to the National Wheat Conference our views on the bearing of European demand upon the American wheat market.

We are studying methods of crop estimating and reporting with particular reference to possible improvements in forecasting crops. While we are not emphasizing technological research, each year one or more graduate students under Dr. Carl L. Alsberg, another of our directors, are making physico-chemical studies of

*In an address at the French Lick Convention, American Bakers Assn.

wheat and its products. Another member of our staff, under Dr. Taylor's direction, is studying the food element in standards of living and living costs.

In the specific field of the baking industry we have made some progress in the preparation of a volume designed to bring into review the outstanding economic aspects and problems of the industry. The existing literature on baking is largely technical, technological. There is clear need for a survey of the industry as an industry—its organization, its financing, its problems of supplies, manufacturing, delivery, and price. We shall not attempt to say the last word on any phase of this subject, but we believe this work will break ground for others, and also point the way for specific pieces of research which are urgently needed.

Many Kinds of Bakers

In any study of a large industry such as yours, one needs to consult published statistics in order to get a proper perspective and to learn certain basic facts. Out of a total of some 25,000 baking concerns in the United States, how many are large-scale enterprises, how many are quite small? How does the scale of operations vary with the location, and with the character of product?

In what proportion is a given community's bread supplied by wholesale bakers, and in what proportion by retail concerns? How much flour and other materials are

used by bakers, and is the quantity increasing or decreasing? What is the relative importance of the different products of the baking industry—bread, cake, biscuits and crackers, etc.? What quantity of cake and similar goods is commercially produced, and how rapidly is it increasing, if at all?

It is impossible to get satisfactory answers to such questions as these from the officially published statistics, and none of the trade associations has very satisfactory

information on these points. Inquiries among bakers and among officers of trade associations related to the baking industry, revealed considerable interest in the possibility of securing better official statistics. As an outgrowth of this interest, within the past month we have been advised that the United States Census Bureau is preparing to make a special census report on the baking industry just as has long been done in the case of other

Do You Know What Equipment Is Best?

If you could see your bakeshop as part of a great National service in which the Nation is keenly interested you would not let a questionnaire on delivery costs and factors lay around unanswered. Stanford University's Food Research Institute got only 80 answers to 1,000 letters of inquiry to bakers, about a matter vitally affecting bakers' welfare. Read here what they want and why. If you don't do your part now your leaders in the baking industry will soon be raising \$100,000 to do this same work at our own cost instead of at the cost of a million dollar research institute. Here is an article about matters calling for thought—and action.

important food industries.

The Census Report

This step is of emphatic importance to your industry. As matters now stand, the data for the bread baking industry are extremely deficient, and are so intermingled with those for the biscuit and cracker manufacturers that neither appears to have any distinct individuality. The issue of such special reports will not only supply statistical information which

is in constant demand, but will tend to enhance your standing among the industries of the country and to attract greater respect from business and financial interests.

We understand that the Census Bureau has prepared a tentative form of schedule for the baking industry, which they suggest for use in the 1924 Census of Manufactures, and which they are about to circulate for examination and criticism.

Perhaps your Board of Governors may find it possible to take some formal action upon this at this time. The Census officials, I am sure, will welcome your frank opinion and suggestions for improving the value of their work. It is within the power of the bakers of the country to make this inquiry a pronounced success or a partial failure.

Household Baking

One of our specific studies deals with the present status and future prospects of household baking in the United States—its extent, the influences which are contributing to reduce it, and the significance of these influences for the commercial bread baking industry. In this connection we have had the co-operation of some of the large flour milling companies, who have been good enough to give us figures showing the drift of their sales in recent years—what proportion goes to the family trade and what to the baking trade.

Similarly, a large street railway advertising company, which makes a regular periodical canvass of the retail grocery trade in the leading cities of a large section of the United States, has secured for us data showing the average weekly sales of bread and of flour in each of 8,000 grocery stores. From these and other sources of information we are uncovering some interesting facts bearing upon the question of baker's bread versus home-made bread.

With our published bulletin on stale bread losses, issued last February, many of you are already familiar. Stale bread causes a huge loss to the baking industry. Our investigation, however, convinced us that the waste can be largely eliminated, indeed, that it is doomed largely to disappear if certain sound and practical policies are put into force by bakers themselves, and if they enlist the intelligent support of retail grocers in overcoming the evil, with the aid of legislation against the practice of accepting returns of stale bread. These conclusions have not been seriously challenged, and we believe they deserve the careful consideration of individual bakers.

Delivery Costs

We now have under way a second intensive study of a baking industry problem, comparable in scope to the stale bread study and exceeding it, we believe, in importance. This is an inquiry into the principles underlying the selection of delivery equipment by bakers. Here again we have no expectation of saying the last word on the subject. Mr. Russell, in the June issue of *BAKING TECHNOLOGY* attributed to us the ambitious purpose of "investigating to find out the most efficient delivery system that can be devised." We do not expect to get quite so far as that. We cannot hope to determine, once for all, which type of vehicle is most efficient in making bakery deliveries.

We shall be satisfied if we succeed in discovering what conditions favor the use of one type of vehicle rather than another, and what conditions favor a different type. The individual baker must study the conditions which apply in his own territory and determine for himself what sort of vehicles, all things considered, will best suit those conditions. He may, of course, by reorganizing his delivery methods, be

able to adopt with advantage certain types of vehicles which he had not believed well adapted to his use. As to this we may in time have something specific to suggest.

As a part of this inquiry we sent out in June a questionnaire to about 1,000 baking companies, distributed over all sections of the United States and Canada. **Up to the end of August less than 100 usable answers had been received**—coming all the way from Halifax to Honolulu. We cannot yet announce the conclusions indicated by these reports. They are still in process of analysis. A preliminary summary may be released within a few weeks, however, and in due course the final report will be printed and sent to the firms which have co-operated in supplying information. I can give you at this time, therefore, only a few of the outstanding facts indicated by these questionnaires.

Favoring Old Dobbin

Out of some 1,600 delivery vehicles reported in use by our correspondents about 50 per cent are gasoline trucks, 30 per cent are horse wagons, and 20 per cent electric trucks. Perhaps this is a typical sampling of the industry, though it suggests that the horse and wagon have been more fully superseded than we had imagined. We should not have expected to find that the number of firms using gasoline trucks exclusively exceeded those using all other types of vehicles, either singly or in combination. Evidently bakers attach high importance to the speed element in their deliveries. Over half the firms using gasoline trucks indicated that speed was a paramount object with them, less than one-fifth mentioned their greater suitability for long distance operations; while nearly one-third of those actually using gasoline trucks reported them to be not economical.

Among those using horse wagons 73 per cent emphasized their low first cost, 77 per

cent their reliability, and 92 per cent their economy in operation, as reasons for staying by this type of delivery vehicle. Nevertheless, more than half the concerns reporting their experience with horse wagons have replaced them with some other type of vehicle—gasoline trucks in most cases. Here again the desire for greater speed was stressed. About one baker in four of those who expressed an opinion on horse-drawn delivery objected to them on the ground of uncleanness; an equal number reported them to be unsuitable for the distances their delivery systems must cover.

The Electric Truck

Our returns indicate that the electric delivery truck is winning the good opinion of an increasing number of bakers. Seventy-eight per cent of the concerns using electrics reported their economy in use as a strong point—only one expressing a contrary view. Twenty-two per cent of electric truck users, however, mentioned as a disadvantage their limited range of operation, while 17 per cent mentioned low speed. On the other hand, an exactly equal number—17 per cent—emphasized the speed of the electric vehicle as one of its main advantages for delivery purposes. Fifty per cent of electric truck users reported them to be reliable in operation as against none who declared them unreliable—a much better showing than for the gasoline car. Seventy-two per cent mentioned their greater cleanliness; 45 per cent indicated their utility for advertising purposes as having something to do with their preference for the electric.

Fourteen bakers who have had no direct experience with electric delivery vehicles reported their opinions. Two of these are now changing over to electrics, one substituting them for horses, the other for light gasoline trucks. Four others believe

electricies to be better suited to their local road and operating conditions, while five report that their roads and service conditions oppose the use of electric trucks. Of this group of fourteen concerns five mentioned the high initial cost of electric vehicles as an obstacle to their use. Evidently the manufacturers of electricies still find considerable sales resistance to overcome.

Some Vital Questions

Many bakers found it difficult or impossible to answer in detail our questions calling for sales and cost data segregated according to type of vehicle used. These are vital questions since the answers to them should reflect the comparative economy and performance of the various types of vehicles used in bakery delivery service. Out of the total of 86 usable reports received sixteen bakers reported that their cost records were not kept in sufficient detail to permit accurate answers to these questions. Twelve others reported that they keep detailed costs, on a basis of pounds delivered or per dollar of sales, but for one reason or another did not give us any cost data. Less than fifty bakers supplied enough information to permit any approximate computation of unit costs.

Now it is obvious that any conclusions based upon the experience of 86 concerns, less than half of whom gave us their costs, can have only limited significance. The question may be fairly asked, however: Would such conclusions not have very great value if they were based upon the experience of, say, 300 or 400 firms instead of 86? We recognize the limited usefulness of these questionnaire answers as a source of information on delivery methods and delivery costs and shall, of course, not depend upon them as our only source of information.

Fortunately other material is accessible which throws light upon the problem. But

the experience of individual concerns is essential, and we are compelled to say quite frankly that if 86 answers out of 1,000 inquiries, many of these incomplete, represent the most that we can expect in such an investigation, then what we shall be able to accomplish through this type of research will be sharply limited. Continuous and increasing support from individual bakers is necessary if we are to make any headway. Your co-operation means, specifically, taking the trouble to supply the data essential to a real understanding of the problem in hand and of the factors which complicate it, or simplify it, in particular cases. Given this co-operation and support, our studies can be made of genuine usefulness not only to those who directly contribute information but to the industry generally. Without such aid it is hopeless for us to expect to contribute anything of value. The continuance of our studies in the baking industry depends largely upon the development of this kind of assistance from you.

Help from Within

One other form of co-operation we should greatly value. Many of you, from time to time, make surveys or studies of specific problems of your business. Thus some bakers make periodical surveys of their local markets; others make special studies of sales and delivery methods, layout of routes, vehicle operating costs, etc. It would greatly assist us in our studies if you could supply us, for confidential use, the results of any such surveys or investigations. They often throw a flood of light not only upon specific business problems, but also upon the more general economic aspects of your industry in its relation to other industries and to the public. It is these latter phases which especially interest us and we hope that you can see your way clear to taking us into your confidence with respect to them.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

Published by the
AMERICAN INSTITUTE OF BAKING
1135 Fullerton Ave., Chicago

Entered in the post-office at Chicago, Illinois, as second-class matter, under the act of August 24, 1912.

Price, Fifty Cents a Number; Five Dollars a Year.

SEPTEMBER 15, 1923

We Work Together

*To win through quality production
and the utilization of scientific research
a welcome for two loaves of wheaten
bread for every one that now finds favor.*

Our Melting Pot

NO PRESIDENT of the National ever took up his duties with so many industrial factors working for the weal of the baker, as now surround, in helpful mood, the baking industry.

When I was asked to assume the duties of president there were in the convention hall millers who had never before looked upon the baking industry as a deep concern of theirs; there were electrical men anxious to help us put perfected toasters in every wired American home that is without one. A famous research chemist was there, giving our industry the latest word of ascertained knowledge about bread with relationship to nutrition. He was the most quoted authority in America in the matter of putting a stigma upon white bread, yet he told us we could do him a favor by helping to dissipate the weird misquotations placed upon his utterances in this regard.

With this great leader of research were the men of the dairy interests, anxious and willing to co-operate in getting what he recommended—more milk into bread, and moreover, anxious as were the millers, raisin

men, fig men, yeast men, and our splendid allied tradesmen in general, to advertise bakers' bread in a way to "glorify the product and forget the brand."

In this era of co-operation, the old clouds of suspicion and hatred have been dissipated. As someone said in the convention, the tree of our opportunity is heavily loaded with ripening fruit; we have only to shake it to obtain results.

At such a time I can only say there is but a single policy to announce. It is conveyed in the words: "Sincerity of Purpose." Knowing the governors and officers of the association, I have no hesitancy in saying that every man is sincere in his intention to serve the baking industry to the best of his ability.

During the coming year nothing radical is to be attempted. The committees which served the association last year will remain unchanged so far as consistent with the new personnel of the Board of Governors. There will be nothing under cover. The trade press—that splendid agency which has done so much in the past to build up the industry and the association—will be taken completely into our confidence, with the implicit trust that they will continue to build for a better industry and a better association. With their generous support, and the support of all those allied with the industry, we should go a long ways *towards the ideal association—a melting pot for all the state and district associations.*

We call upon every person connected with the industry, directly or indirectly, to address this office with their candid criticisms of the association's activities. Your letters may not be answered, but they will receive the careful consideration due them by your servants, the officers of the American Bakers Association.

RAYMOND K. STRITZINGER,
President.

Norristown, Pa., Sept. 18, 1923.

The New Stride

IT WAS Matt Carpenter, or someone else who writes beautiful things for bakery walls, who wrote a story about a group of brick masons and an architect. The masons were working on a cathedral that was to be the most beautiful structure in all the land.

The architect, with the plans in his hands, asked each mason what he was doing. One answered, "A fair day's work for a fair day's pay." Another answered that he was "laying brick." But the third answered, "Sir, I am helping to build a cathedral." He alone wanted to see the plans and shared the architect's joy in his creation.

We saw this little story on the wall of Matt Carpenter's Milwaukee bakery. It came to mind time and time again, as we saw bakers at French Lick Springs catch the vision of a national industry, engaged in a great national service. They can never again be indoor bakers, with hearts and hands centered in hope and action within their own plants. The Cathedral of the Baking Industry now has many builders.

An Omaha Triumph

SELDOM has a newspaper article appeared on the baking industry which shows so much new editorial "gumption" as the article in the Omaha World-Herald for Sept. 16. A good allied tradesman carried it to our office, as usual in such cases. The city editor of the World-Herald, instead of jumping at the usual conclusion that fair price commissioners, mayors, aldermen, and many editors jump at when they want to "make face with the public," sent out real reporters to make a real survey of what the women want in the form of bread.

The reporters asked for a 5-cent loaf. Often the bakers told them they did not

have any—but could get one if he wanted it. Some had it—but said there was no sale for it. The reporters interviewed scores of grocers. From one and all they learned a great truth. It was that cheap bread, of poor ingredients, was not wanted by the people at all and could not be sold for all its price attractiveness against more expensive bread which had its value built fairly and honestly into the loaf.

How different is this from the vision of the ordinary editor who goes blindly into an assault upon the bakers whenever he thinks he can beat the wind for cheaper bread? What these reporters found in Omaha others can find in Indianapolis and New York. The quality loaf has won its way and women cannot longer be lured away from it by the price lure alone. They want the best the baker can make, in the cleanest surroundings he can create. Pioneers made Omaha a battle-ground to test out this theory and now they obtain their reward in full public recognition.

In Indianapolis

THE greatest exponent of quality baking in Indianapolis it was who declared, as he stood at French Lick Springs, among many men who wish bread to carry other foods to market, that "the quality loaf has only just begun to grow. It is a tiny baby. In a few years we will be looking back and wondering how we ever got away with the thing we called bread in 1923." Already we have at the elbow of the baker the walnut men, asking for walnut loaves; the raisin men, the fig men, the malt men, the milk men, each advocating special loaves, and the nutrition experts backing up many special claims. No wonder H. H. Haynes of Portland created such applause and laughter with his humorous references at French Lick to "frying pan bread" as the real quality loaf.

The Bread of Life

To Produce It We Must Solve the Problem of Surplus Skim Milk and the Quality Loaf as Well

By E. V. McCOLLUM*

Department of Chemical Hygiene, Johns Hopkins University

"A stigma is upon white bread, placed there by people of limited information. As matters stand I can assure you there are strong forces tending to discredit white bread. I have myself never suggested the disuse of milled cereals, or white bread. The point which I have emphasized is that white bread must be supplemented with such foods as make good its shortcomings. So far as we now know the simplest, cheapest and most effective way to improve the quality of bread is to introduce more milk solids into its composition."

—E. V. McCollum

IT WAS suggested to me that I speak to you about The Bread of Life. Whenever mankind at any period in his history has grown cereal grains bread of some kind has formed a prominent component of the human diet. The cereal grains have excellent keeping qualities as compared with most other kinds of foodstuffs such as fruits, vegetables and meats, and whenever, as frequently happened throughout history, there was a shortage of food, the bread grains were the last supplies available, and served often to maintain life until the famine conditions abated. It is natural that the name of an article of diet with such a history should have become proverbial. The expressions, "The bread of life," "Bread is the staff of life," "Give us this day our daily bread," and others, show clearly how prominent a place the thought of bread had in the minds of the people of Mesopotamia, Arabia, Palestine, and Egypt, in ancient times. It is well to call attention also to the proverb, "Man shall not live by bread alone," and also to the old Hindu proverb, "A man may live without bread; without buttermilk he dies." Both of these suggest that the philosophers of olden times had made observations which anticipate some of the results of modern research in nutrition.

Bread, of a type similar to that now made from refined flour and now so uni-

versally eaten in America and Europe, has a permanent place in the human diet in all places except in the regions of excessive rainfall, and others where rice culture is the only kind of cereal culture which can flourish. I welcome the opportunity to discuss with you some matters relating to the place of bread in the American diet.

Everywhere in recent times we are confronted with the advice or patriotic admonition to eat more wheat or eat more bread. This idea was, I believe, formulated with a desire to restore basic prosperity to American farms, through making a market at as favorable a price as possible for the existing supplies of wheat for which there is now no foreign market. Americans are being urged as well to eat more meat, to eat more dairy products, and to eat more of half a dozen kinds of foodstuffs less prominent as components of our diet. Obviously it is unsound to advise a people among whom there are far too many who are already overweight, to eat more of everything.

Dr. Joslin, an eminent specialist on diabetes, has said that this disease is closely associated with overweight. Life insurance companies assure us that their records show that the expectation of life of a middle-aged man who is moderately overweight is distinctly lower than that of his lighter-weight brother. The slogan "Eat more wheat" is an expression of a desire

*An address before American Bakers Assn. Convention at French Lick Springs, Ind., Sept. 13, 1923.

that the public shall eat more of a grain which exists and for which the market is poor, in the belief that financially the nation will be better off if this is done.

If the public responds and consumes more wheat the price will advance sufficiently to make wheat farming more profitable and wheat production will parallel the demand. In order that the farmer shall continue to prosper, the public must therefore continue to eat as much more wheat as possible in order to sustain the industry. We can sympathize with the patriotic zeal of a public which responds for a short time to such an appeal. It requires more than ordinary credulity, however, to believe that such a response can be permanent unless there is something more fundamental involved than the support of a particular type of farming. I may be wrong, but as I read the signs they tell me that the public is going to be guided in its selection of food essentially by two kinds of influences. One is the appetite. People are going to invest their money in no small degree in foods which appeal to the sense of taste. The other is the instruction which they receive concerning what is best for their health. There is at present a greater interest in eating for health than at any time in the past.

Slogans a Factor

Concerning the first of these influences it is not necessary to comment here. In the sale of certain foods and beverages financial success will turn upon the attractiveness of the article sold. Concerning the second influence, those who provide the public with its food supply will be interested in the extent to which instruction is an effective factor in influencing the buyer.

Those who are promoting slogans intending to induce people to eat more of any kind of food should realize that there is a great army of women teaching domes-

tic science in the schools and doing extension work in the field either under the direction of State Departments of the Government, State educational institutions, federal bureaus, the Red Cross, and others, who have followed with enthusiasm and intelligence the results of experimental studies in nutrition during the last 15 years, and are teaching children and adults what to eat. **The teaching is based upon the belief that the nutritive qualities of food cannot be determined by chemical methods, but can be shown by experiments on animals and observations on the effects of diets of different kinds on human beings.** These women constitute a selling force of great efficiency. They are too intelligent and too well educated to be influenced in the slightest by what advertisements say about foods. They are being guided by the evidence placed before them by investigators in the field of nutrition. Any one who is skeptical of the extent of the influence of these teachers would do well to initiate an investigation in his own neighborhood and find out for himself what is going on.

The basis of this new campaign of education regarding what to eat is experimental data which show the specific dietary shortcomings as well as the virtues of individual natural foodstuffs. Animal experimentation showed long ago that two diets having like chemical composition as shown by analysis might have widely different nutritive values, as shown by the development of domestic animals confined to each. All modern researches in nutrition have tended to establish the fact that the keynote to successful nutrition is a proper selecting and combining of foods so far as to form diets which are complete in that they furnish everything necessary for proper development during growth and for the maintenance of health in the adult.

One of the outstanding features of the

results of nutrition studies is the establishment of the fact that most of our natural foods are incomplete when each serves as the sole source of nutrition. It is only by the wise combining of two or more natural foods that a properly balanced ration can be secured. This balancing of the diet from a psychological standpoint means securing proteins of high quality, an inorganic or mineral supply which is appropriate for growth and maintenance, and the provision of the necessary vitamins, as well as providing sufficient energy in the form of carbohydrates and fats in digestible and easily assimilable form.

The procedure by which information regarding quality in foods is secured is designated as a biological analysis of a foodstuff. It is only by appropriately planned feeding experiments that the quality in any natural food or combinations of food can be made clear. One of the facts which is outstanding as the result of many experiments in a number of research institutions is that the cereal grains all need supplementing in order to make them dietetically complete, even when the whole grains are used. Experimentation has further fully established the fact that the refined products of the cereal milling industry are less complete in several respects than were the whole grains from which they were formed. In other words, refined or highly milled cereal products such as bolted flour, degerminated cornmeal, and polished rice have come to be generally understood to be foods which are decidedly deficient in respect to several important nutritive principles. There is as a result some tendency on the part of that fraction of the public which becomes enthusiastic about matters relating to diet, to condemn these products and to demand whole grain breads. There are good reasons why this change cannot come about.

Bolted wheat flour is said by all authori-

ties on nutrition to be of value from a nutritional standpoint, mainly as a source of protein and of energy, since it consists essentially of proteins and starch. Its proteins are of poor quality, its inorganic content is totally inadequate for the maintenance of physiological well-being, and it is essentially lacking in all of the known vitamins. It is essential, therefore, where wheat flour enters into the diet to any considerable extent, that it should be combined with such foods as will make good its shortcomings.

Biological Analysis

For several years I have been urging that the dietary deficiencies of refined wheat flour do not constitute a valid reason for discontinuing its use. The growing of cereals is an agricultural practice so efficient and so in keeping with our established dietary habits that it would be folly to suggest its discontinuance. Modern farming implements make possible the growing of cereals in enormous amounts with a relatively small investment of human labor. The cereals, especially those which enter into the making of bread, are very acceptable to the appetite and so necessary for the satisfaction of our established dietary habits that it would be preposterous to contemplate substituting any other type of agriculture for cereal growing up to a certain extent.

It is well known to all students of agriculture that the continuous growing of cereals on almost any soil is followed within a quarter to a half of a century by marked falling off in yields, and therefore continuous cropping to cereals cannot be made a permanent system of agriculture. The yields of wheat in western Canada have fallen off on an average of four bushels per acre during the last 30 years. All grain-growing areas in the United States have had the same experience. Nevertheless,

there is much land in the middle and far west, as well as in foreign countries, where wheat growing can be made very profitable and its production is a wise policy, at least for a long time to come.

Types of Diet

During the last 16 years I have devoted my energies to experimental work in nutrition, the study of scientific agriculture, and human experience, with diets of different kinds. I have become convinced that it is a sound national policy to educate the public to select its foods in a manner which conforms with those practices which mankind has adopted at different times and places in the world and which have led to success in its physical development. Any system of education regarding foods must, of course, not only be physiologically sound but agriculturally sound as well. Aside from the experiences of flesh-eating people, such as Eskimos and certain American Indians, there are two types of diet which are of very great interest to us in this connection. One of these is the diet of the people in the warmer and wetter regions of the world where rice growing is more successful than the growing of any other kind of cereals.

The other is the type of diet used by people in the dryer parts of the world and in a few mountainous regions where it does not pay to farm according to our modern system in this country. In both of these regions we find people succeeding better with their physical development than the average person of the United States at the present time. I base this statement largely upon the freedom of both of these groups from skeletal defects such as would probably be classed as rickets, and in the quality of their teeth. Both skeletal and dental defects are very common in America and Europe at the present time, and these are in considerable measure to be ac-

counted for on the basis of faulty nutrition of the expectant mother, the nursing mother, and the child from infancy to maturity. I have dealt fully with these questions elsewhere, and cannot for lack of time expand upon them here.*

Milk as a Factor

The dietary system which seems to me to be most sound for Americans to adopt is one in which the consumption of dairy products is distinctly higher than the present level, and in which the consumption of that class of vegetables of which the leaves are eaten is decidedly intensified. This, together with an increase by many people in the consumption at regular intervals of suitable amounts of fresh uncooked vegetable foods of the kinds which are palatable in the raw condition and are bacteriologically safe, should, I believe, so safeguard the factor of quality in our food as to markedly improve the nutrition of children who grow up on this regimen. If this plan is to be adopted it means necessarily a slight reduction in the consumption of certain other foodstuffs, since practically every one in this country may be assumed to be eating as many calories of energy as are needed.

Foes of White Bread

One gives offense to some one whenever a suggestion is offered as to where the cut should fall. Naturally one thinks first of meat and bread made from white flour. As matters stand I can assure you there are strong forces at work tending to discredit white bread. I have myself never suggested the disuse of milled cereals, but on the contrary have always insisted that the keynote to successful nutrition is the

* The American Home Diet.
The Newer Knowledge of Nutrition, second edition.

proper selection of foods, that the demonstration that white flour is deficient in several respects does not justify the conclusion that white bread should not be eaten. The point which I have emphasized is that it must be supplemented with such foods as make good its shortcomings. Realizing then the importance of wheat as an agricultural crop, and realizing the importance of milling as a factor in the commercial handling of the basic material of our bread supply, it is evident that no return to whole wheat flour is possible. The white flour industry has come to stay.

I believe, therefore, that I point the safe road to the baking industry when I suggest that instead of pinning their faith upon results to be obtained by slogans adopted by those interested in cereal growing or in cereal milling, they turn their attention earnestly toward removing the stigma from wheat bread. The way to do this is entirely clear.

I may first consider the question from a standpoint of permanent agriculture. In any new country such as our middle west of one hundred years ago, cattle raising was the first industry to be established. Cheap land and lack of transportation made it possible to produce cattle profitably for their hides and tallow only. The same was at one time true in Argentina. With increased population and improved transportation the cattle industry gave way to grain farming. This is still in practice but is gradually giving way to diversified farming, because under continuous grain cropping the land deteriorates and cereal culture becomes unprofitable. At a certain point in decreased yields of wheat or other cereals farmers turn to a type of agriculture which is permanent. Denmark and Switzerland long ago made this transition. New York, Wisconsin, and Minnesota have more recently adopted the same policy, i. e., a change from grain

growing to dairy farming. All experts in agriculture agree that this is a wise measure. We have not yet reached the point of saturation, where it is imperative that this change be adopted, but it has been found necessary in localized areas, and this process must continue. This means that we now have a large production of dairy products and every reason to expect that the supply of such products will be augmented with passing years.

Milk Is Called For

It so happens that milk is so constituted as to correct in a very effective manner the dietary deficiencies of the highly milled cereal products which form our bread grains. Owing to a widespread catering to appetite there is a great consumption of butter and cream in excess of the demands for skimmed milk. The result has been a great surplus of the latter, which has hitherto not found a suitable utilization. Its return to the farm to be used as a supplementary feed for swine was about the best use that could be made of it. Inventive genius has, however, provided us in recent years with effective machinery for the manufacture of skimmed milk powders of the highest grade. This solves the marketing problem of skimmed milk, for it was impossible to market it effectively as a human food in a liquid state. There is little reason now why any skimmed milk in any part of the country should be wasted, for milk powder plants on a relatively small scale can be operated effectively for the production of high grade products, and with financial success to the operator.

So far as we now know, the simplest, cheapest and most effective way to improve the quality of bread is to introduce more milk solids into its composition. This improvement of the bread supply is sound from the physiological, agricultural, and economical standpoint, as well as being

sound in that it does not run counter to our established dietary habits.

There is no way in which the public can be more effectively influenced in the matter of consuming more bread than in so improving the loaf that the women who are sources of information to those around them regarding food and nutrition will be convinced that a liberal bread consumption is one of the simplest, easiest, and cheapest ways of providing a liberal portion of the total calories of the diet in the form of nearly a complete food.

Completing Our Foods

It is by no means essential that bread be made an absolutely complete food. It would run counter to human instincts and desires to restrict the diet solely to bread. Nor would it be sound from any standpoint to attempt the adoption of such a policy. We do not require bread to supply everything that is necessary and in optional amounts for satisfactory nutrition, but only that it be excellent from a standpoint of nutrition.

At the close of Dr. McCollum's address he was asked from the audience if he would not advocate the use of whole wheat in preference to white bread. He replied sharply "No." He explained that whole wheat bread still was deficient in providing all the body building forces and that the best way was to supplement white bread with milk in the mixture and then eat plenty of greens and raw fruits. "And after you eat what you should, then go ahead and eat what you like."

"White bread," he said, "is only under a stigma from those of limited information. If you will help to eradicate the idea that I have condemned white bread you will do me a favor." This statement was received with applause as most foes of white bread have quoted Dr. McCollum in their favor.

Wheat and Flour

AS FAR as the whole wheat food is concerned, I had to deal with that question during Food Conservation days. When the whole wheat was fed to a population, as happened in Belgium, marked intestinal disturbances followed. There is no doubt in my mind that people of sedentary habits can profit by a moderate admixture of the outside covering of the wheat kernel in the flour. The way some people talk about this subject you would think that eating whole wheat was like a religious observance; no part of it could be left out. As I called to the attention of one of the men at that time, we were inclined to reject the hide of the animal although we were willing to consume a large part of the rest of its anatomy. I am sure your research work along these various lines will be helpful. It seems to me the PRESENT METHOD OF OFFERING VARIOUS KINDS OF BREAD IS A WISE ONE. We cannot make the stomachs and intestinal tracts of a whole people act alike.

—From a letter of a noted physician and surgeon, formerly in the Food Administration service.

After reading BAKING TECHNOLOGY for several months have found it to be of great help to me in my work. I was especially interested in your article by Fenn O. Stone, on sanitation, and I believe in a few years you won't be able to find any dirty little bake shops in back rooms such as are now sometimes found.

—O. T. LAW, State Food Inspector, Indianapolis, Ind.

You have an article in Baking Technology which interests me very much and I would like to put this issue into the hands of each of our salesmen. I want to add that your bulletin is very interesting and I am enjoying it more and more each issue.

C. H. VAN CLEEF,
American Diamalt Company.

Bakers and Food Officials

How Co-operation Is Replacing the Old Time Police Spirit in Enforcing Sanitation in the Bakeshop

By I. L. MILLER*

State Food and Drug Commissioner for Indiana

A MEMBER of the United States Bureau of Chemistry, in a recent editorial, said: "It is true that from the beginning of the agitation for effective food laws, a few broad-minded men in the food industry had the vision to see that if adulteration and misbranding could be reduced to a negligible quantity or entirely eliminated, the food industry as a whole would be greatly benefited because of increased public confidence and that the men in the industry who put out sound products would be benefited most of all by the elimination of unfair competition with adulteration and misbranded products." **Opposition to food law enforcement today is confined almost exclusively to those who are engaged in the manufacture or distribution of foods which are either adulterated or misbranded or which are produced and handled under uncleanly conditions.** The manufacturer or dealer may not agree with some particular provision of the law, or may regard certain interpretations of the law or methods of procedure of the food official as incorrect or unfair, but he does believe in the value of sound, effective food control.

The United States Bureau of Chemistry may rightfully be regarded as the keystone of food law enforcement. Through its Office of Co-operation each state becomes a part of the machinery for enforcement of the National Food Laws. The manufacturer or distributor of misbranded or adulterated foods can easily be reached through this office by the state in which

they are offered for sale. Any state official may apply for, and quickly receive, any scientific data desired or information necessary relative to trade and manufacturing practices of any manufacturer or dealer wherever located. The value of the work of the United States Bureau of Chemistry is largely the outgrowth of its research work.

Bureau of Chemistry

Some idea of the value of the activities of the Bureau of Chemistry to the baking industry may be obtained by an examination of the Notices of Judgment, or court decisions which it issues. To date more than eleven thousand cases involving foods, drugs and feeds have been passed upon by the courts. An examination of the first five hundred Notices of Judgment issued shows that nearly twenty-four percent of the articles included are used by the baker. Included in the list were flavoring extracts, molasses, milk and cream, butter, flour, honey, nuts, currants and raisins. Nearly five percent of the judgments related to flavoring extracts on whose labels were such statements as "double extract," "marvel," "concentrated," "highly concentrated," "superior," and so on through a long list, all of which were untruthful. Milk, cream and butter were usually short in their most valuable constituent, namely, butterfat. The currants, raisins and nuts were filthy and rotten. The honey and molasses generously adulterated with glucose.

Of five hundred Notices of Judgment

*An address at American Bakers Assn. Convention, French Lick Springs, Ind., Sept. 10-15, 1923.

issued ten years later a little more than sixteen percent covered articles in use by the baker. Flavoring extracts are conspicuous by their absence from these notices. Milk, eggs, nuts and fruits made up this list.

Of the five hundred notices issued after January first of the current year, 30 percent covered articles in use by the baker and included butter, cream, milk, eggs, flour, various seeds, nuts, dried fruits, cocoa and chocolate. Campaigns similar to that waged by the United States Bureau of Chemistry against adulterated and misbranded foods in interstate commerce have been intensively carried on in a large number of states in relation to intra-state commerce.

As to Bakery Products

While co-operation between Federal and State food officials has been very effective in securing to the baker more acceptable raw materials, it has not been possible to extend the same degree of co-operation to the regulation of finished bakery products. These products are perishable and for the most part are consumed locally. However, bakery products are perhaps less amenable to adulteration and misbranding than most other classes of foods. A notable example of adulteration was the sweetening of pies some years ago with saccharin, an artificial sweetener of no food value. This practice was very quickly broken up wherever the products entered interstate commerce. The more common adulterations consist in the use of color to simulate that of eggs, the use of little or no milk in breads labeled as milk breads, and the use of the word "cream" in connection with products that contain no cream. The sale of goods which the customer may have reason to believe contains eggs or milk, when, in fact, these materials are absent, or are not present in appreciable amounts,

is highly reprehensible. Both eggs and milk are very rich in the factors most essential to the nourishment and maintenance of life and have become widely consumed because of this fact. Such practices can be comparatively easily eliminated through the efforts of the alert food official in co-operation with the bakers, most of whom do not countenance them, or countenance them only because they believe competition makes it practically impossible to do otherwise.

Bakers' Canned Fruits

The pastry baker is often credited with the use in his pies of canned fruits of questionable quality. It has been charged that the bakery furnishes an outlet for swells, springers and other canned goods for which a market cannot be found through legitimate channels. Regarding this charge I can only speak from experience with the bakers of Indiana. A rather extended investigation of bakers' stocks of canned goods indicated no basis for the assumption that the baker is an extensive purchaser of spoiled canned goods. With very few exceptions, the goods in stock were of good quality.

Of greater importance than adulteration or misbranding of foodstuffs is sanitation in their preparation and handling, since it directly relates to the health and general welfare of all who patronize the bakery. The manner of storing raw materials, the processes of manufacture and handling in the bakery and the practices followed in the distribution of the finished product, merit the closest scrutiny of the food official.

Food officials and the leaders of the food industries have demanded, and in most states have secured, the passage of sanitary laws more or less strict in their provisions which if enforced would cure most of the evils due to lack of sanitary prac-

tices and appliances. Because of insufficient funds and the consequent lack of personnel and sometimes lack of co-operation, the most difficult problem confronting the food official and the baking industry is the proper administration of sanitary laws already on the statute books. This problem can be solved to the extent that the food official and the baker can "pull together."

Should Co-operate

This is the day of "big business." Stupendous enterprises have been undertaken and completed on every hand. The baking industry has been touched by this new spirit and large companies have been formed and bakeries of immense capacity have been built. After inspecting one of these beautiful plants and noting the labor saving devices, the spotless cleanliness everywhere, and the spotlessly dressed employees we are apt to feel that the problem of sanitation in the bakery is nearing solution. With the exception of a single food industry, sanitation is most important in the bakery since it produces one of the two essential and universally consumed foods.

In our optimistic moments we must not forget that although these great plants have immense capacities, yet the bulk of bakers' bread is still and will be for a long time produced in small shops which number hundreds or even thousands in every state, and that the operators of these shops are not so well trained or equipped as those of the large bakeries. Usually the large plant is in charge of a specially trained superintendent with trained foremen under him. Raw materials are scientifically tested and processes scientifically directed. Such plants do not need and perhaps should not receive much official attention from the food official, but he should have the support and co-operation of their owners and operators at all times. It is

then the plants that cannot afford scientific control that need and deserve the most help from the food official.

Fortunately in most states, bakers have realized the value of mutual effort along lines that will elevate the industry and incidentally increase their business and have organized themselves into associations in which problems vital to the industry are freely discussed and ideas exchanged. These associations are in most instances effectively co-operating with the food official in the enforcement of sanitary measures. Your National Association has adopted a sanitary code which compares favorably with the strictest sanitary code included in any state law or regulation. Some state associations profiting by the example of the National Association, have secured or aided in securing the passage of satisfactory sanitary laws.

I believe but few bakers wilfully or intentionally operate dirty bakeries or wilfully or intentionally violate food laws. Psychologists tell us that no written or spoken word conveys the same idea or mental picture to any two persons. The word "sanitation" probably has as many different meanings as there are persons who see it written or hear it spoken. This may account in a measure for the varying conditions found in those shops whose proprietors believe they are conducting sanitary establishments. If this be true, it is then readily seen that the work of the food official in co-operation with bakers either individually or in Associations, is largely educational.

A Sanitary Standard

In order to define what constitutes a sanitary bakery, it is necessary to make certain arbitrary requirements which more or less perfectly secure the desired results when complied with. Instances occasionally occur in which every physical require-

ment has been met and yet the shop is unsatisfactory and cannot be considered sanitary.

This may be due to what is sometimes called the lack of the "sanitary sense" or the lack of a fine perception of the meaning of the term sanitation as applied to bakery equipment. I recall a recent case in which a pastry bakery was found in very bad condition. On the floors were accumulations of dirt, in some places a quarter of an inch or more in depth, on the pans were accumulations of burnt grease and dough; greasy, filthy rags were used for wiping the pans before re-using, dirty racks and general lack of neatness were apparent throughout the shop, and yet the operator steadfastly maintained that his place was strictly sanitary.

So insanitary was his shop that it had to be closed for two days during the cleaning process. In another shop the employees were found drawing the bread from the oven and cooling it on the shop-floor. The shop was generally untidy, the delivery equipment dirty and the delivery trucks devoid of means for protecting the uncovered, unwrapped bread, yet the operator declared that the bakery was first-class. Even after several days' cleaning under the direction of the operator, the shop was but little better.

Some Shops Unfit

These fortunately, are extreme cases but all such shops must be eliminated if the baking industry ever reaches its goal. Through the efforts of the food official and the baking industry as a whole every baker must be taught that he gains and holds business through the quality of his products, cleanliness in their production and honesty in their sale.

Confidence of his customer is perhaps the greatest asset of the baker. Frankness and openness on the part of the baker can

do much toward securing this confidence. The baker who keeps his shop as though expecting an inspection by his customers at any time, can not go far wrong from the standpoint of sanitation and proper methods of handling. **The baker who fears to admit into his shop the sunshine and the scrutiny of the public deserves the suspicion which he receives.** Two moderate sized bakeries lately visited in widely separate cities were each located on prominent streets and were of glass on two sides exposing to the view of passersby not only the operation of the ovens but many of the other operations in connection with the handling of the dough and the baked loaf.

Confidence an Asset

Both enjoyed large distribution and very deservedly. The plants were clean, the employees were healthy and pleasing in dress and the general appearance of the plants seemed to say "come in, we have nothing to hide." Constant admission of visitors to intimate contact with bakery operation of course is not advised, but if the bakery business is to be extended the public must be assured of clean, high class products and no evidence is so convincing as that gained through the senses of sight, smell and taste.

It is all the more important that no opportunity be lost for securing and confirming the confidence of the consumer since people are easily influenced by rumors, which in themselves are of no consequence but which through repetition result in serious misconceptions. The food official can render valuable service in this respect to bakers whose shops and business practices are worthy. His reports have done much to inform the public regarding bakery operation and to establish confidence in bakery goods. A statement of fact from him will usually set right any

misconception that may arise in the minds of the public.

The Owner Must Learn

Many bakeries would be more successful in every way and would be made to meet every official requirement if only their owners could be made to understand that their standing among people depends upon what their shop and delivery equipment is like. Under the Indiana Bakery Law the inspector in grading the bakery considers the cleanliness of floors, walls, ceilings, shelves, counters, back-rooms and cellars; the provisions for dressing-rooms, toilets and wash basins; the light and ventilation; the appearance of employees; the condition of delivery equipment; the general sanitary condition of the premises; the employees' health certificates and the character of the water supply. The grades given are Excellent, Good, Fair, Poor and Bad. Of one hundred inspection reports drawn at random from the files of the current year, two were rated excellent, thirty-one good, fifty-eight fair, nine poor and none bad.

An analysis of these reports indicates, judging from physical equipment, that sixty instead of thirty-one of these bakeries should be rated good. Floors, walls, shelves and counters were good, dressing-rooms, toilets and wash basins were provided, light and ventilation were acceptable and delivery equipment was sufficient, yet something was lacking in twenty-nine cases.

Further analysis indicates in some cases failure to secure health certificates and in others failure to secure certification of the water supply by the State Board of Health, but for the most part the lower rating is due to lack of that intangible something sometimes spoken of as "atmosphere," but which for want of a better name I will term "lack of initiative." Elbert Hubbard

says, "The world bestows its big prizes both in money and honors for but one thing. And that is initiative." He defines initiative as "doing the right thing without being told." Many of the plants are given the lower rating because they fail to inspire confidence in the quality and cleanliness of their products. Their operators have failed to exercise their inalienable right to "do the right thing without being told."

The remedy for the situation just described undoubtedly lies in the better training of bakers. The baker of the future must, if he would withstand competition and meet legal requirements, have more accurate knowledge of raw material values and of scientific manufacturing and distributing practices. The American Institute of Baking, together with other schools that have been established, will furnish opportunities for the securing of this knowledge and will mould the baking industry of the future.

Must Be Trained

The food official and the baker are mutually concerned in the production of better goods. Probably no advance in the baking industry in past years has been of greater importance to the baker or of more benefit to the consumer than the utilization of milk and dairy products in the baking of bread. Studies carried on in the schools have revealed the existence of malnutrition to an alarming extent among school children, both of the cities and of the rural districts. Under-nourishment is also common among adults. Wonderful results have been obtained through the institution of school lunches of milk and crackers. Children take on weight, become strong of muscle and proficient in their studies when previously they had been the despair of their parents and teachers. These miracles have happened so often that no prop-

aganda is necessary to make converts.

It is perhaps unnecessary to point out to the baker the opportunity offered through these discoveries. Milk and bread form a perfect diet. Milk baked in bread and served with butter should be a boon to the under-nourished and especially to those who do not relish milk in its fluid state. Again milk supplies are unsafe or at least questionable. Milk baked in bread is made safe yet retains its vital elements. Bread in which the water is replaced by milk has better keeping qualities and the taste is enhanced. The utilization of milk in bread baking not only aids the baker and is beneficial to the consumer, but furnishes an outlet to the farmer for the milk which he is producing in ever-increasing quantities.

Several states have enacted special bakery laws. Several others have considered such legislation. Bakery regulation has invoked much discussion and in some instances bitter fights. It is not my desire to add to these discussions but only to emphasize the viewpoint from which bakery legislation should be considered. Regulation of some character is inevitable.

Legislation's Origin

This being true, it is better for all concerned that legislation should have its origin in the industry where accurate data is available, but the framers of bakery laws must ever keep in mind the welfare and interests of the consumer, which in the end is identical with the welfare and interests of the baker. In addressing the State Senate of Massachusetts in 1914, President Coolidge declared that "Statutes must appeal to more than material welfare. Wages won't satisfy, be they ever so large. Nor houses; nor lands; nor coupons, though they fall as thick as the leaves of autumn. Man has a spiritual nature. Touch it and

it must respond as the magnet responds to the pole. To that, not to selfishness, let the laws of the commonwealth appeal."

Personally, I am of the opinion that building construction, sanitation of shop and delivery equipment, character of raw materials, health of employees, character of water supply, standard weights and disposition of stales are all proper subjects for legislation. If I may be pardoned for again referring to Indiana, all these features are included in the Indiana Bakery Law, which is truly a bakers' law, the bill having been drafted by the bakers and enacted into law chiefly through their efforts. During the four years of its enforcement no formal protest has been filed against any of its provisions by an Indiana baker.

The only modification that has been suggested by the bakers is the elimination of the three-quarter pound loaf, which I think bakers and food officials alike agree is an uneconomical loaf to bake. The law has brought gratifying results because the bakers have supported it and have worked hand in hand with the food officials for better conditions in the baking industry. While no law is ever one hundred percent efficient in its operation, but few state laws of any nature are more universally obeyed than the Indiana Bakery Law.

This law I think well illustrates the power of psychology. It contains the same provisions that bakers of other states have hotly insisted would ruin the baking industry, yet the bakers of Indiana have made splendid progress and much improvement in their plants is evident to the food inspector. I doubt if any bakery law that has been proposed in any of the states would result as disastrously as feared by its opponents. Success in any case depends chiefly upon the mental attitude and the will to do, both on the part of the official and the baker.

Bakery Bread Production

*How a Production Manager Views the Problems Involved with
Regard to Ingredients and Shop Machinery*

By L. W. HASS*

Of the W. E. Long Co., Chicago, Ill.

WITHIN a relatively short time after the baking industry began to take practical cognizance of the results of scientific research into the intricacies and complexities of its raw materials progress is noted all along the line in the production of the staff of life.

It must be the aims of the baker to produce a loaf of bread which will not only be a trade winner, but which will stimulate the per capita consumption of bread. This can only be accomplished by turning out a quality product of which can be conscientiously said that it was produced from pure and wholesome ingredients, in a clean plant, by a sanitary process of manufacture.

The raw materials used in white bread should be of highest quality. It is not sufficient merely to buy from dependable manufacturers. A systematic control of the various materials should be practised by having each delivery checked by careful laboratory analysis. It would pay the baker well to do this as it does in other industries, especially those engaged in the manufacture of bread ingredients.

The main ingredient in bread is flour. The character of flour naturally varies with the quality of the wheat crop. While it is true that acceptable bread may be produced from flour widely different in character, best results can only be had by using flours of certain characteristics. The dough forming qualities of flour are due to the presence of at least two types of protein, which, when wetted with water, form

what is known as gluten. A good bread flour should contain around 11 per cent of good gluten. The character, and to some extent the quantity, of gluten largely determines the baking quality of flour. Due attention, therefore, should be paid to this constituent of flour.

Water is next to flour the bulkiest bread ingredient. Without water the formation of dough is impossible. The water in bread should be of medium hardness. Too soft water gives sticky doughs with poor gas retaining properties. Soft water may be readily made suitable for bread making by the addition of mineral salts. Many of the preparations sold as yeast food or bread improvers are designed to correct this possible deficiency of water.

Yeast is universally used in bread as a leavening agent. Besides furnishing gas to raise the dough, yeast performs other important functions which are not all well understood. The gas it generates mechanically develops the dough; but incidentally the products of yeast activity exert marked influences, chemically and physically, on the properties of gluten. Further, yeast activity greatly influences the flavor and the nutritive qualities of bread.

The function of yeast foods is primarily the stimulation of yeast activity and propagation in the dough. They have incidental effects which tend to improve the baking quality of flour. The proper use of a good yeast food is attended with an economy in yeast and sugar. The yeast saving effect of these preparations is greater with slow than with fast doughs.

The effect of salt in bread doughs is well

*In an address at the Convention of American Bakers Assn., French Lick, Ind., Sept. 10-15, 1923.

known to the baker. It toughens the dough and retards fermentation. Whether the latter is due to physiological action on the yeast plant or to the toughening of gluten, seems not definitely established. It is most likely the combined result of both. At any rate, salt is very important as a means of control in the maturing of dough. Its importance as a flavoring agent must not be underestimated. Bread containing insufficient salt tastes flat. Too much salt causes a salty taste. The right amount of salt greatly aids in developing in bread that compelling taste that invites to increased bread consumption.

Milk's Popularity

Sweetening materials are commonly added to bread, although they are in many cases not necessary. Granulated sugar is mostly used. When a rich bloom without excessive sweetness is desired, the less sweet sugars are in place such as dextrose and maltose in their various forms. Sugar also serves as material from which yeast produces the gas that raises the dough. To sustain prolonged fermentation more sugar is required than with short processes.

Malt preparations may be used as partial sugar substitutes. They at the same time serve as more or less satisfactory yeast foods. Malt in bread doughs is distinctly beneficial according to the latest exhaustive investigations.

There is at present a tendency to abandon malt products. Dry malt or malt flour has practically disappeared for obvious reasons. The growing unpopularity of bakers' malt extract is probably due to prejudice and the lack of uniformity and inferior quality of many products on the market and to the extended use of yeast foods, which latter are more convenient to handle.

One ingredient which is justly gaining

favor with the baker is milk. This ingredient is mainly used to enrich and improve the nutritional value of bread. It has no equal for this purpose. Milk is available to the baker in various forms, the sweetened condensed product being generally preferred. Milk gives to bread a rich flavor and fine bloom and a white and firm crumb and adds to its keeping qualities. The milk used must be in good condition as otherwise it is apt to impart an off flavor to the bread. A cheesy flavor in bread is often due to the use of stale or spoiled milk.

Of shortening a liberal amount is being used in most commercial formulae. Lard seems to be preferred to other shortening materials. Of late quite a number of bakers are using butter fat in increasing quantities as sole shortening.

Various ingredients in addition to the ones already mentioned, are used in commercial formulae. Some of these are designed to serve a specific purpose, others are claimed to improve bread in all directions. There are various classes of absorption boosters, vitamin bearing ingredients, etc. While some of these ingredients may have some merits they are not necessary, not to mention the possibility that their users may unknowingly violate the bread standards of the United States Department of Agriculture.

Some Formulas

The selection and proportioning of the various ingredients in a bread dough formula have an important bearing on the character of the product. Different markets require different types of bread. The possibility of having the same character of bread all over the country is very remote. It is true that the quality loaf will win in the long run, but the definition of such loaf will be different for different localities for quite some time to come. To be successful,

the baker has to make a loaf which will take and should not force a loaf on his customers which he thinks they should like on account of its enhanced nutritive qualities. It is surprising to find by a comparison of formulae from different parts of the country how plain a loaf is demanded in some localities and how rich it must be in others.

No general formula can be given which will give satisfaction in all cases. It may be safely said that medium stiff doughs give best results under most shop conditions. The doughs should not be too soft to cause undue difficulties in the make-up operations, on the other hand they must not be so tight as to obviate the use of all dusting flour in any of the machines. The correct amount of water to use must be carefully determined and varies greatly with the same materials under different shop conditions.

The quantity of yeast to be used depends on the character of the flours, the formula, the process of fermentation and the type of bread desired. There are formulae in use for pan bread which use as little as 0.75 per cent while others use over 2 per cent of yeast.

Yeast foods are generally used in the proportion recommended by the manufacturer.

Most commercial formulae carry over 1.5 per cent of salt. A good amount to use is from 1.7 per cent to 2 per cent, the higher amounts to go with the richer formulae.

The sweetening material in bread doughs must be carefully proportioned. Very often too much sugar is used with the intention to produce a rich and good toasting loaf. Too much sugar not only interferes with proper fermentation, but also with the flavor of the finished bread. Bread tasting too sweet is too satisfying and, therefore, causes a decrease in its con-

sumption. If good toasting properties are desired sugars of low sweetening power should be used (such as corn sugar, glucose, maltose) or a liberal quantity of milk. The proportion of cane or beet sugar added as such or in sweetened condensed milk usually should not exceed 3 to 4 per cent.

A good bread formula should contain a liberal proportion of milk. Most of the best formulae contain 6 to 8 per cent of sweetened condensed milk or an equivalent quantity of evaporated or dry or fluid milk. If larger quantities of milk are used difficulties are apt to be experienced in handling the doughs and baking the loaves. A formula carrying this amount of sweetened condensed milk requires no or very little additional sweetening material. This may be granulated sugar or malt extract. When malt is used the formula seldom carries more than 1 per cent in the case of non or low diastatic products and still less of medium or high diastatic preparations.

The quantity of shortening in a good formula should not be less than 2 per cent. When much milk is used less shortening should be employed than with a formula low in milk.

Rather wide variations in the proportions of some ingredients are possible while others must be used in more or less fixed proportion. Generally, excessive quantities of enriching ingredients are more harmful than too small ones.

Ingredients

The various ingredients should be accurately weighed and properly assembled. When a blend of flours is used, the component flours must be thoroughly mixed before they enter the mixer. It is best to dissolve the various soluble ingredients such as sugar, salt, malt, milk and yeast food in the mixture before drawing in the

flour. Yeast should be dissolved separately to avoid its coming into contact with too concentrated a solution of salt. This solution should then be incorporated with the mixer before drawing in the flour. Shortening may be added shortly after the dough has formed in the mixing. To insure thorough incorporation of shortening, it should not be added too late.

Various ways have been tried to insure a thorough distribution of the various ingredients, especially shortening. Homogenisers or emulsifiers were put into use and found to give very satisfactory results. However, the installation of these machines is very costly and their operation tedious; for these reasons, homogenising of ingredients did not become very popular so far.

Dough Fermentation

There are at present two processes of bread making of commercial importance. The straight dough and the sponge dough process. In localities where a large and spongy loaf is desired, the sponge system is generally practiced, while in localities where the market demands a small and compact loaf, the bread is generally made by the straight dough process.

Good bread can be made by both methods. Either process has its advantages and disadvantages. The straight dough process involves a greater risk as it is more difficult to save a straight dough in case of an accidental delay than a sponge. In the straight dough all ingredients receive the same amount of fermentation, while in sponge dough the bulk of the flour as a rule receives excessive and the smaller part of the flour very little fermentation.

For this reason there is a difference in the flavor of bread produced according to these different processes from the same materials. The straight dough requires a very careful handling and tedious manip-

ulation, while with sponge doughs no punching is necessary. However, double mixing is required for each sponge dough. In point of flavor, bread from straight doughs is superior to sponge dough bread, while the reverse is true as to volume, color of crumb and softness of the loaf.

Proper equipment should be at hand to handle the process decided upon in the most efficient way. This fact is very often overlooked and the operations greatly hampered by inadequate facilities.

Whichever process is used, an accurate record should be kept of the various manipulations and especially the temperature and time of fermentation. By doing this, any deviations from the standard practice can be readily discovered and some abnormal behavior of some doughs properly traced. The doughs should be sent to the machine when they are scheduled to be ready and not whenever the make-up crew is ready for them.

Very few plants are using ferments, no doubt on account of the tediousness of this method.

Bread and the Market

With an established formula, it is up to the production man to produce the type of bread the market requires. He has to determine accordingly the process, the fermentation and manipulation of the doughs. It is often a very difficult problem to just find the best fermentation and treatment of the dough to obtain the desired results. There is no rule which can be applied to determine the exact fermentation period required by the materials used. Further, the character of the flour changes enough to make deviations necessary from an established good method.

Much effort has been put forth by research workers to find a so-called fool-proof process which can be applied without modification to any flour.

The No Time dough process is a result of such investigations. This process when made public attracted much attention and much interest in it is displayed by bakers in all parts of the country. This process makes use of high temperature for a quick development of the dough. There is no doubt that bread of good volume and fine appearance can be made by it. The bread, however, has a distinctive flavor and it remains to be seen whether this flavor appeals to the bread consumer. If it does, we will have a very simplified process of bread manufacture which greatly reduces the hazards of the present processes. With this process, it is not necessary to maintain definite conditions in the dough room as to temperature and humidity. Scarcely any dough troughs are required and very little floor space is needed for the dough room. There is further an important saving in refrigeration and labor cost. A process of this kind would be highly desirable since it not only eliminates fermentation difficulties, but also affords greater safety of operation since the doughs are only mixed when they are needed and little dough would stand on the floor at the time of a break down or a shut off of power.

High Speed Mixers

Most modern plants operate high-speed mixing equipment. These machines mechanically develop the dough to a great extent, thereby reducing the work required of yeast and at the same time improving absorption and producing a better dough. It is impossible to imitate the effect of high speed mixers by "grinding" in slow mixers no matter how long the mixing is prolonged. It must be remembered that the full benefit of high-speed mixing is only attainable when the doughs are set fairly slack and if the size of the doughs is not too large.

To facilitate the setting of doughs at

the proper temperature, thermometers are now attached to the mixers. If such instruments are properly installed they record the temperature of the dough very satisfactorily and no tipping of the mixer is necessary to ascertain the temperature of the dough. Such thermometrical devices are very serviceable and greatly relieve the mixing crew of unnecessary operations.

Operations in the make-up room are more or less mechanical and automatic. They influence quality of the fine product but little. In fact, the bread is made in the mixing and fermentation room. In most shops dividers, rounders, intermediate provers and molding machines constitute the make-up unit. These machines are inter-connected and form an automatic unit. Their capacity is so calculated as to correspond to the baking capacity of the ovens. It is most important to secure the proper machine for the purpose for which it is intended and one should be mainly guided by the performance of it, i. e., how it does its work and how long it lasts to do the work properly. All machines punish the dough, but there are some machines which do this more severely than others. Such machines, naturally, are highly undesirable.

Until recently the dusting boxes on the make-up machines were of very poor design and did not work satisfactorily. Proper dusting is important for it very often is the only cause of streaks and other defects of the crumb in bread.

Between each machine treatment the dough is given a short recovery except between dividing and rounding. The provers are often improperly installed. A uniform temperature should be maintained in it to avoid undue chilling or warming up of the pieces of dough. If this precaution is not observed streaks and other defects in the bread will result.

Much care must be exercised at the molding machines, as proper molding has much to do with the size of the loaf and character of the crumb. Improper molding is one of the causes of ununiform and unsatisfactory bread and an unduly large number of cripples.

Panning the bread is usually not done with sufficient care, either due to inattention of the operator or due to too great speed of the machines. It is difficult for a man to pan more than fifty pieces of dough a minute continuously. Irregular placing of the loaves causes many unnecessary cripples.

The molded bread should be put into the proof box as soon as possible to prevent crusting and possible chilling of the dough. The racks further should be filled within a few minutes, otherwise ununiform proof will result.

The proof box temperature should be kept at around 90° and enough humidity carried to prevent crusting up of the loaves. Temperature and humidity are best regulated by automatic devices and care should be taken to have a uniform distribution of heat and humidity. This is best accomplished by having machines similar to those used for conditioning dough rooms.

Care in the Oven

When the bread has reached the proper proof it should be put into the oven as soon as possible. It should not be permitted to stand in front of the ovens for any length of time, otherwise it will crust up and acquire too much proof. Different types of bread require a different amount of proof. Generally, the correct proof can be ascertained by lightly touching the loaf. If an impression is made by a slight pressure with the finger and the dough comes slowly back upon releasing the pressure, the bread has about the right proof.

Baking of bread should receive due at-

tention since much harm is done, especially by underbaking the bread. It is better to give slightly too much than insufficient baking. A one and a half pound loaf of bread should bake in about 40 minutes and this is possible by means of regulating the oven temperature. Thermometers and hydrometers often are not properly placed to record the baking temperature, but if bread is baked on time as mentioned above, it is easy to ascertain the temperature the oven should register in order to properly bake.

Steam is often used in baking, but some plants bake entirely without steam. Whenever steam is used, it should be turned on before the loading of the ovens and should be turned off soon after loading is completed. Much damage can be done by leaving on steam too long and by using high pressure steam. The pressure should be kept below ten pounds. Low pressure steam not only gives better results, but also is more economical.

Conclusion

Great strides have been made in making the bread making process automatic and continuous. This has been accomplished except as to the dough making operations. It is possible today to have the machinery from the divider to the wrapping machine hooked up and functioning automatically with the least possible expenditure of human effort. The mixing of dough has been simplified but the process is not automatic and continuous. The developments in the next few years will show whether it is possible to reduce the dough mixing to continuous and automatic operations. If this could be done, it would signify a great accomplishment and the bread making process would be entirely automatic from beginning to end. The No Time dough process may prove to be the stepping stone to this achievement.

Books for the Baking Laboratory

BERGEY'S MANUAL OF DETERMINATIVE BACTERIOLOGY. By the Committee on Determinative Bacteriology of the Society of American Bacteriologists, David H. Bergey, Chairman. Williams & Wilkins Company, Baltimore, Md. 442 pp. Price \$5.50.

Dr. Bergey has prepared here an up-to-date manual that will be of special interest to all engaged in any phase of the bacteriology of bread production, or bacteriological problems with reference to bread ingredients. The manual was prepared at the University of Pennsylvania by a committee of the Society of American Bacteriologists under the chairmanship of Dr. Bergey.

It deals with the classification of the Schizomycetes. This is the first classification edited since 1901 when Chester's "*Determinative Bacteriology*" appeared. The classification is based upon that selected by the Society of American Bacteriologists during the period from 1917 to 1920.

A key is given in the first section of the volume whereby any known organism can be identified after its morphologic, physiologic, and pathogenic characters have been studied. Organisms that have not appeared in the literature are omitted from the manual.

All organisms listed are placed in alphabetical order in the index. An unknown organism is first traced to the order to which it belongs, then to the family or sub-family, then to the tribe and finally to the genus. Each organism is described as to morphology, physiology and habitat. The student is greatly assisted in developing a knowledge of methods of classification by a historical survey of the various classifications from the original discovery of bacteria up to the writing of the present volume.

It is planned to keep the manual up-to-date, issuing supplementary lists from time to time as new species are studied.—H. E. TURLEY.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Significance of Wheat Hairs in Microscopical Examination of Flour. G. L. Keenan. U. S. Dept. Agr., Bull. 1130, 1-7 (1923).—Flours made from purified middlings material show a lower hair count than those containing lower-grade mill stocks, and the possibility is therefore suggested of making a classification of flours based on the hair count alone. W. H. ROSS.

Gluten as a Factor in Grading Wheat. G. L. Teller. Modern Miller 50, No. 10, 22-3 (1923).

—Proteins in flour and wheat, the variation of gluten in flour, the N in wheat proteins, the gluten in shriveled wheat, the gluten variation in wheat and flour, the protein in bran, H₂O absorption and gluten in the value of gluten in wheat flour are discussed.

RUTH BUCHANAN.

Potato Meal as a Source of Nourishment for Small Children. Erich Müller. Klin. Wochschr. 1,2378-80 (1922).—Potato meal can be used in the compounding of artificial foods for small children. In some cases its ingestion is followed by a slight laxative action which is, however, transitory. The urine is usually alkaline. The meal is rich in inorganic salts and contains proteins that are almost as easily utilizable as those of milk and far more easily utilizable than those of wheat. Potato meal is cheaper than wheat meal.

MILTON HANKE.

The Vitamin and the Vitamin Bunk. H. C. Lythgoe. Gen. Sci. Quart. 7, 112-23 (1923).—Mainly about abuses by commercial houses and their relation to food and drug laws and to advertising law.

E. J. C.

Pure Leaven Culture. A. Fornet. Umschau 26, 754-6 (1922).—A short account of the success obtained in producing a standard leaven to be used in place of yeast in bread making.

E. G. R. ARDAGH.

The Chemistry of the Strength of Wheat Flour. H. E. Woodman. J. Agr. Sci. 12, 231-43 (1922).

—Samples of gliadin and glutenin isolated from the typical strong and weak flours investigated by the racemation method gave results which are suggestive in relation to their bearing on the existing ideas of flour strength, since it is shown that gliadins from weak and strong flours are identical proteins but glutenins prepared from the same sources are two distinct chemical compounds. Existing ideas on flour strength are to be modified. The factor which determines size is most probably connected with the diastatic capacity of the flour, while the factor which determines shape which appears to be directly related to the physical properties of the gluten of the flour is dependent on the particular glutenin mechan-

ism possessed by the wheat. It is demonstrated that proteins can be extracted by 0.2 per cent KOH without suffering change.

R. B. DEEMER.

PATENTS

Bread Containing Cereal Germs. D. Chidlow.

U. S. 1,450,483, April 3.—Germs of wheat or other cereals are added to bread dough after about 70 per cent of its period of fermentation has elapsed, so that the undesirable action of the enzymic or other substances associated with the germs will not take place during the entire period of dough conditioning.

Bread. F. R. Warner. U. S. 1,447,054, February

27.—A mixture of malt extract (containing active diastase) 84, $(\text{NH}_4)_2\text{HPO}_4$ 6.5, monobasic Ca acid phosphate 6.5 and H_3PO_3 3 per cent is used in preparing bread dough. This mixture may be used in the amount of 1 per cent, the weight of the flour.

Bread-Making. Ward Baking Co. Brit. 186,633,

October 2, 1922.—Substances rich in water-soluble B vitamins are substituted for equal weights of the sugars usually employed. The substances are obtained from such by-products as rice polishings, wheat bran and the germs of cereals. Fat, some of the coloring matter, and the bitter and acid substances are extracted with C_6H_6 , CCl_4 , etc. The materials are then mixed with 10 times their weight of H_2O and cooked to gelatinize the starch, and on cooling to about 100° F. an infusion of 4 to 30 per cent, preferably 10 per cent, by weight of barley malt or malt flour is added to effect solution and conversion of the starches into maltose and dextrins. Instead of saccharifying by a malt infusion, a suitable acid may be used such as HCl, H_2SO_4 , H_3PO_4 , citric or tartaric acids. Glucose, dextrin, soluble proteins, and mineral salts will then be present in the product. The temperature of the mixture is maintained at 100-120° F. from 2 to 3 hours to allow the proteolytic enzymes to dissolve a considerable proportion of the proteins.

Bread-Making. R. Graham. Brit. 187,935, Nov.

18, 1921. In bread-making from cereal and soy-bean flours, the unpleasant taste of the soy-bean is removed by using a large amount of yeast, or by using a yeast food such as inactivated yeast, sugars (glucose, levulose, cane-sugar, or molasses sugar), rye or buckwheat flours, and fermenting. Examples of suitable proportions are given, the doughs

being fermented for 1 or 1½ hours, at a temperature of 20°. When rye flour is used it is mixed with yeast and H_2O and, after ¾ of an hour, is kneaded with the other materials. When old soy-bean flour is used, additional rye or buckwheat flour is added or the ebullition point of the liquid in the dough is raised by increasing the content of crystalloid solubles, i. e., salts, sugars. Cf. C. A. 16, 2372.

Bread-Making. Ward Baking Co. Brit. 186,923,

Oct. 3, 1922.—Relates to a bread-making process of the type described in 156,635, the fungus used in the present invention being *Mucor rouxii*, which is preferably grown on rice, swollen to twice the original size by cooking in an open vessel with boiling water in the weight proportions of 100 parts of rice to 75 parts of water and cooling to 35°. A seeding stock is used which is prepared by growing *Mucor rouxii* in a moist atmosphere, on cooked rice containing 75 per cent of H_2O , slowly drying the rice and mycelium, while the mass assumes a dark color due to the formation of spores, and grinding to a powder. The mixed rice and seeding stock are spread on trays in layers from 1 to 3 inches in thickness. The enzyme product may be extracted with H_2O , which does not extract the color of the spores, and in this case sporulation is stimulated by allowing air circulation through the mass, which is kept in a room with a moisture-laden atmosphere at a temperature of 25-40°, preferably 35°, from 1½ to 3 days. The enzymes may be dissolved out of the cake-like mass before or after drying and the solution, with or without concentration used in the dough batch. The cake-like mass may be used in powder form, in which case sporulation and consequent discoloration are restricted by preventing the air circulation with tray covers and lengthening the period of growth. The mass is dried by heat, in air or a vacuum at a temperature not exceeding 75° and ground to a meal which will pass through a mesh of 100-200 to the inch. The meal may be used in the proportion of from ½ to 2 pounds to 1000 pounds of flour and the other ordinary ingredients. Both the solution and meal contain sugar produced by the action of diastatic enzymes on the rice starch, which sugar contributes in making up the normal amount of sugar used. In the sponge process the meal is added, at the sponge stage, to the flour, water and yeast. Compare C. A. 17, 837.

Bread and Meat Together

How One Will Serve as a Carrier for the Other as They Jointly Go to the Consumer's Table

By CHARLES W. MYERS*

Of Armour & Co., and the American Institute of Meat Packers, Chicago

IN BEHALF of Armour and Company, whom I represent upon this signal occasion, and the Institute of American Meat Packers, of which organization I represent the Committee to Confer with Trade Associations, I desire to express sincere appreciation for the invitation to address your body.

History tells us, and ever-increasing and heretofore unrecorded evidence confirms it, that bread and meat have been the first two essential foods since the creation of mankind. Crude as were the primeval efforts to produce bread from wheat and food from meat, the fact remains that they sustained life, wrought mighty nations from small tribes whose very health, strength and vigor overturned empires, created new eras and influenced civilization in its onward, unbarred progress.

The baker of loaves has been an historic figure. The eating of bread increased the size of the fields, alongside of which grazed the herds which supplied the meat, both combining to form that hardy staff of life which through the ages has demonstrated its practicability; has endured with a persistence of greatest credit and through the application of scientific principles has proved the logic of its continuity.

As Dr. Barnard expressed it, "what could be more practical than a definite co-operation between these two surpassing industries; what is of more vital importance than emphasizing and visualizing the placing of a slice of meat between two slices of bread—and keeping the idea con-

stantly before the consuming public, from childhood to old age?"

None of us needs to be told here of the numerous life-giving elements of bread and meat for health complete. We, in this industry, are all fairly well informed as to their content of vitamins, calories, proteins, etc. While the discovery of their value is comparatively new, the principle has always existed.

Good business sense ordains that we should capitalize upon the knowledge which we possess. And, since we know so much about our products, infinitely more than the great majority of consumers, should we not devise ways and means whereby we may constantly herald to the world the value of mankind's first and foremost food fundamentals—bread and meat?

In the case of bread and meat, each needs the other. No matter what changes may occur in the rules of man's living, nothing will ever alter the great natural order of these two indispensable foods. From the primitive days of our first ancestors and throughout the centuries to come, humanity will inevitably partake of these two life-sustaining and health-rewarding edibles.

And so, gentlemen, I bespeak the heartiest interest and complete accord in all that tends toward the aggrandizement of the indispensable loaf of bread. There is nothing in the world like it or will ever supersede it. The progress of the baking industry and its present-day status are but an indication of what the future holds.

*Before the French Lick Convention, American Bakers Assn.

BAKING TECHNOLOGY

*A Journal of
Applied Science
in Baking*



*Published by
The American Institute
of Baking*

Vol. II

CHICAGO, ILLINOIS, OCTOBER 15, 1923

No. 10

Driving Forward to a Goal

BECAUSE the baking industry will only be served to the best advantage when it is completely organized, and is working through one central spokesman with all other industries that may affect its welfare, a meeting at the Sherman Hotel on October 15, marks an important milestone of progress. The meeting was called to talk about bread. There came to the meeting millers of international fame, elec-

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association men, and representatives of the baking and milling press. One question only was asked. Answers came from almost every one of the groups represented. The question was: "How can we, unitedly or separately, put more bread into consumption?" The answer was that the best way to do it was through concentrated effort upon some specific problem. There then came up the problem of "Toast

trical manufacturers, electrical jobbers, jam makers, jelly makers, butter makers, dairymen, yeast manufacturers, allied tradesmen, gas company representatives, wholesale bakers, retail bakers, restaurateurs, hotel

for Breakfast," as a nation-wide crusade.

It was voted unanimously to make Chicago the center of a great try-out of a supreme effort in co-operative service. It was voted to form an organization, with one rep-

representative from each and every industry represented at the "Chicago Toast Lunch," to form the Central Committee.

The task allotted to this Central Committee was to organize for Chicago during the week beginning December 3, a toast campaign. The object was to get an electric toaster into every wired home in Chicago, not over ten per cent of which, it was stated, now have electrical toasters in their kitchens.

And what means were to accomplish this end? From all parts of the Tiger Room of the Hotel Sherman, where the luncheon was held, came the answers. They are worth something to every baker, whether he has any interest in toast or not, for they show what the power of co-operation and fellowship, and teamwork can accomplish. They illustrate the road down which the baking industry must travel to the goal its farthest visioned members already see in sight.

"During the week of December 3," said Alice Irwin, who conducts classes in cooking for the Peoples Gas Light and Coke Co., "the gas companies will emphasize toast in every way. We will show the people that toast isn't simply browned bread, but that it can be made a base for chicken a la king, for jellies, jams, cheese, meats—that it has scores of different, agreeable uses."

"There are 4,000 milk wagons in Chicago," said M. O. Maughn, spokesman for the National Dairy Council, "and I think most of them can be induced to fly banners during the week, calling attention to the 'Toast for Breakfast' campaign."

A Week to Open

"There are 2,500 bakery wagons," volunteered a baker from Chicago, "and I think most of them can be induced to put toast campaign banners on their wagons for that week."

"Why confine it to the week?" asked an

allied tradesman. "Why not just make that week the starting week, and continue on through the rest of the year to encourage the use of toast?"

"We have sold eight electric irons for every toaster sold," said E. W. Lloyd, representing the Electrical Clearing House. "That is wrong. We see enormous possibilities for toaster sales and we will do all we can to help along this co-operative movement. Our people are discussing a substantial advertising appropriation to help out the general cause."

Thus the movement to make of Chicago a test center for one specific campaign in the work of putting more wheat into consumption was formally launched.

Who got it up? Who got up the National Wheat Conference last June, and who organized the National Wheat Council, as a result of that conference?

It would wrong a great multitude of helpers to say anybody in particular did. First there were the farmers, with their grievance because foreign markets had collapsed. Second, there were the bakers, who knew that American hotels and restaurants had cut the bread portion with each meal from four ounces, the pre-war portion, to two ounces, the post-war portion. Then the bakers also knew how America's magazines, America's four-minute men, America's Home Economics teachers, America's Food Administration leaders, had all combined to talk the people into wheatless days, wheatless breads, wheatless biscuits, war bread substitutes.

They knew that the leaders of America owed it to the farmers to "reverse English" on the propaganda of the war period, and put the thought of bread consumption back to the normal basis in public eating-places. They knew also that great nutrition authorities, such as Alonzo Taylor of Stanford University's Food Research Institute, held that the pre-war bread ration

of four ounces per meal was the advantageous ratio, not the skimmed-down portion of two ounces served since the war.

Wheat Conference Action

So all these forces came together at last in the National Wheat Conference. Statesmen and government officials came there also, for they knew that there could be neither peace, plenty, nor prosperity for the nation as a whole, until there was peace and prosperity on the farm, whence flows our basic wealth.

The organized life of America was represented on the Wheat Council as it formally came into being. To show forth to America the problem confronting us, its sponsors had set forth that an exportable surplus of 170,000,000 bushels had existed on the average each year for a number of years. As the foreign market had now collapsed, America must find a way to consume this average exportable surplus at home, to keep things normal in the wheat fields. One extra slice of bread per meal per person, it was shown, would accomplish this end—and incidentally only bring American dietary habits back to the normal from which they had been driven through wartime propaganda.

But now came in that curiously pervasive streak in human nature, sometimes called "the seamy side." Hundreds of editors saw a chance to "pounce upon a new idea." They did not seek to find out what was meant by the "average annual exportable surplus." They demanded that 170,000,000 bushels of wheat be produced, piled up in the fields at that moment. They jeered themselves hoarse when the wheat was not produced.

Then the Wheat Council of the United States went into the form of foundation labor, required to lay the basis of any substantial movement. Now arouse the raucous chorus: "Wheat Council Is Dead." "Movement is a flivver." But it went right on.

It was only laying foundations for splendid service to America. And the chorus of disesteem deterred it not at all.

On this Council bakers met with men from practically the whole of America's organized industrial and agrarian life. A social experiment was being undertaken, in which bakers were to play a rôle on the front skirmish lines, while behind them lay the forces of our civilization, all the way back to the wheat fields. It was a movement of voluntary service to a cause, in lieu of the curt governmental interference that might otherwise be invoked—an interference which in the past has proved itself capable of developing more diseases than ever it could cure.

Focuses on Toast

The Wheat Council opened its offices in the Temple Building in Chicago, established Harrison Fuller as executive vice-president in charge, with Grosvenor Dawe as secretary. It established Miss C. E. Chatfield as nutrition expert.

There came the day of the "Toast Luncheon" at the Sherman Hotel. Miss Chatfield took hold of the problem of preparing a luncheon that would illustrate the many possible uses of toast. She received at once the co-operation of all factors whom toast can serve as a carrier. Jam makers sent in their best jams; honey makers their best honey, butter makers their best butter, cheese makers their best cheese, the meat packers their best cuts of cold meats for sandwiches, and electric manufacturers their latest styles of toasters.

Miss Chatfield, assisted by Alice Irwin of the Home Service Department of the Peoples Gas and Coke Co., arranged all these foods into a most fetching menu. Guests at the luncheon served themselves, cafeteria style. Upon foundations of toast, both gas and electrically made, they placed servings of chicken à la king, cheeses, jams, and other

delicacies. A fruit salad, as "something suitable to go with a toast luncheon" completed the luncheon.

Many of those present, in speeches afterwards, referred to the new ideas they had been equipped with, to take home from this luncheon. Miss Irwin spoke of her broadcasting service. She said she would be glad to broadcast stories about bread and toast during the week of December 3, and plans were at once made to make the radio carry bread's story electrically through the air in that week of electric toaster demonstrations.

New Uses for Bread

Even the coffee merchants were present in force, and told how they would help along with the toast movement, because coffee was so delicious when served with toast. Harrison Fuller spoke the keynote of the day, when he said that without confidence no co-operative movement could succeed, and that in a co-operative movement there was no room for "competitive advertising," but there was only room for teamwork, in which nobody in the team tried to harm another, while all swept forward to the common goal.

Mr. Maughn responded for the milk interests when he told how they had grown out of the "foolish notion that it paid to advertise milk as containing more nourishment per quart than a bushel of tomatoes." He said that under the new system the milk people advertised that health, strength and beauty were bottled up in each quart of milk.

Dr. H. E. Barnard praised a butter advertisement in which a lad was pictured on a billboard with a pound of butter in his hand. He was crying out to companions at a picnic: "I've got the butter, bring on your bread." The companions were shown just coming over the hill, with loaves of bread in their hands. On behalf of the baking industry he thanked the makers of this ad-

vertising and many others who had adopted "bread and" slogans in their bill posters.

Rumsey on Toast

Dr. Rumsey explained what toast really was and why it must be made fresh when eaten. John Burns, veteran observer and president of the Allied Trades, told why all must work together to put this work across, and how more flour sales, more butter sales, more jam sales, more honey sales, more coffee sales must follow in the wake of this "glorifying of the product with a forgetting of the brand."

C. A. Patterson, editor of the *American Restaurant*, was greeted with much applause, when he told how the restaurants would all put stickers on their menu cards during Toast Week—"eat toast with it." He was one of the most interested listeners to comment that toast in restaurants was not made according to the best possible standards. He invited information about making toast—especially information showing that blackened bread was not toast, because toast must be made fresh with a browned, not blackened surface.

Thus the meeting went.

Bakers now have a new objective on which to focus their notice. It is the Toast Week for Chicago, beginning December 3. If it wins it will mean a victory for the largest team that ever played together for the commonweal of our industry.

Our Alumni

OUR last outgoing class made a total of 65 graduates of the School of Baking now out in the trade. So far misfortune has overtaken only one. Harry Scott had his hand caught in a suction fan in Hazleton, Penn., and suffered the loss of one finger. James R. Harris, secretary of the alumni association for the class of last April, reports that all members are at work and making progress.

Oluf Petersen writes from Omaha:

"Sooner or later the bakers will wake up and find it necessary to take a course or will be left behind. My months in the school took the guessing out of my work. I am making better bread every day and business is good." Oluf Petersen was a plant foreman many years before he took our school course. He, if anybody, should know its value.

From Webster City, Iowa, Ray S. Farlin writes: "I have influenced one man to take the school course. To me it has been a wonderful inspiration and has brought out facts I did not learn the least thing about in my previous five years on the bench. Now I can handle any kind of dough under any sort of conditions and I think of Bill Walmsley every time I apply his lessons. Every detail in the school is of value to a student whether he has been a baker 20 years or 20 minutes. Few bakers know WHY they use what ingredients they do. I wouldn't take a million dollars for my education in the baking game. Why? Because a good thief could steal my million but nobody could steal my education."

Thus is flowing back to the Institute the good will in which it sent its first half hundred graduates out into the baking world.

Chemists at Work

AS THE chemist takes hold in the baking industry, reducing many of mother's intuitions about baking to codified formulas, and obtaining uniformly excellent baked products, members of our industry need not think that he is performing specially prodigious services for them alone.

Two chemists, Murdock and Lowe, opened the eyes of capitalists to the possibilities of gas as fuel. They developed ways to burn; in and through the application of their researches, \$379,000,000 was taken in, in rev-

enue for the sale of gas in 1921, alone. For their work they are still to be adequately honored.

When we read of the achievements of the great alkali industry we are only reading of a problem in applied chemistry, as worked out by Le Blanc, who died in a French poor house, and by Solvay.

The American founder of the house of du Pont was a chemist—a student of La-voisier, the father of chemistry. Luckily for the family fortune he seized control of industrial tools, and of capitalism, and so built up his family in wealth rather than turning to new discoveries while others exploited those he had made in the nature of explosives.

The farmer now takes the Agricultural Experiment Station for granted. Yet it is here only because a student of Liebig—Samuel W. Johnson—brought back to America from Liebig's laboratory in Berlin such a love for agricultural chemistry that he in-oculated the politicians with it in Washington, after a long campaign of education to demonstrate the value of enriching soils with chemicals.

And from a Child

The spirit of giving, as far as the Institute library is concerned, has become epidemic. The other day a little ten-year-old friend of the librarian, Miss Margaret Schoener, called and presented the library with a 1920 edition of the Stone-Millis Arithmetic. She gave as her reason for the donation that one day, while in the library, she overheard one of the students, who wished to brush up on percentage, ask for the library copy. As the only copy on hand was checked out, he was disappointed and had to content himself with another book. When even little children take an interest in our library, we believe we have every reason to be optimistic as to its future.

Bread at the Dairy Congress

Roscoe H. Shaw, of the American Institute, Represents Baking Industry at Washington Meeting

IN THE history of American industry there never before was such a gathering as "The World's Dairy Congress," held this month in Washington, D. C., with branch meetings in Philadelphia and Syracuse, N. Y. Here was an industry which gathered itself together, in all its world-wide power, and "registered" its importance in the domestic economy of the human race in a most decisive fashion.

A thousand dairymen were present. They spoke in nearly all the languages of the globe. They were hailed in Washington by cabinet members, received by the President, dined by a Public Reception Committee of distinguished citizens, and exchanged information among themselves on the condition of the dairy industry in points as far apart as Poland and Porto Rico. Everyone who had a hand in dairying was there—not merely milk producers. There were scientists, merchandisers, government sanitarians, cheese makers and breeders.

At their meetings through a ten-day period the American baking industry was represented by Prof. Roscoe H. Shaw of the American Institute of Baking; there were on the program two speakers who had for their subject the greater use of milk in bread. These speakers were R. M. Allen of the Research Department, Ward Baking Co., and Charles A. Glabau, technical director of *Bakers Weekly*, New York.

Who among those that witnessed the magnificent assemblage of five, long railroad trains put at the disposal of this congress's members, can ever imagine again, the dairy industry being whiplashed by political windjammers, as the baking industry sometimes still is? Who can imagine "sanitary

crusades" organized by state milk inspection divisions?

Leaders of these federal and state activities were present and gathered in the spirit of mutual confidence and esteem, in which it was shown that the dairy industry was going further than the law in sanitation and further than the law in quality production, to win the world's good will for dairy products.

Prof. Shaw came back to the American Institute enthused over the magnificent way this one industry had learned to "glorify the industry and forget the brand."

He sat at a banquet where he saw Prof. E. V. McCollum, greatest of the vitamin experimenters, sitting near Aaron Sapiro, wizard of the art of co-operative marketing for farmers, and organizer of over fifty different producer co-operative organizations. With these leaders he saw the Chaplain of the House of Representatives, our Secretary of State, Charles Evan Hughes, our Secretary of Agriculture, Henry C. Wallace and our Secretary of Commerce Herbert Hoover.

With them were government officials from many foreign countries and many American states. All of course caught the vision of a united dairy industry pressing forward in service with an acutely organized desire to win popular goodwill. They will know where to turn from now on for co-operation and support of men they know have caught step with their desires and their hopes for human welfare.

When can the baking industry so strengthen the bulwarks of its organization that it can hold a congress like this? When

can it fully claim the national recognition and public esteem towards which it is striving with rapid growth?

A merchandiser of milk, who attempts also to sell merchandising ideas to bakers, was at the congress. Answering the question here propounded he declared that he believed that the baking industry was right now in the throes of controversies and problems of growth through which the dairy industry had already made its way.

He mentioned the suspicion of the little baker towards the big baker. That was comforting, for anyone observing that situation finds a hundred big and little bakers working together for the things that are common to the welfare of both, to ten who used to work, that was in a spirit of confidence and goodwill.

The baking industry can run through those eight hypothetical years with great rapidity. Perhaps an infectious contagion for organization will overcome the industry this very year and bring its local, state, and national organizations forward a thousand strong for each hundred now associated for advancement.

In the grounds of the American Institute of Baking, for instance, a nutrition laboratory is just coming to completion. It was established because bakers realized, along with the great universities, that the chemist had not been able to get at the truth about human nutrition. Instead of depending on the test-tube and chemical analysis of food factors, they found some had to be gauged that were successful in eluding chemical analysis, yet could be determined by observation.

Hence the method of observation had to supersede chemical analysis. Each great university found this out, and as results were obtained of seeming advantage to one industry or another, its devotees rushed forward to claim the advantages of newly ascertained truth.

Sometimes enthusiasm to capitalize new discoveries outran the truth. If one food sustained an animal's life to maturity, it still might leave the animal incapable of rearing young. Prof. Shaw took hold of these problems in experiments under the direction of C. B. Morison at the American Institute.

Was the expenditure in that work of timely importance to the baking industry?

Many Nutrition Laboratories

The experience of Prof. Shaw in Washington and elsewhere with the Dairy Congress delegates, is illuminating in this particular. Of the scientific papers read on milk ten had to do with reports from laboratories such as that in which the baking industry now seeks its own enlightenment.

How similar to needed education for the public in baked-goods values were these papers on milk values, delivered with J. M. Hamill, medical officer of the Ministry of Health, London, acting as honorary chairman, and Surgeon General H. S. Cumming, U. S. Public Health Service, presiding:

"The Nutritional Value of Milk," Dr. E. V. McCollum, of Johns Hopkins University.

"Milk as Food," Dr. Lafayette B. Mendel, of Yale University.

"The Optimum Amount of Milk for Children," Dr. H. C. Sherman, of Columbia University.

"Blindness in Children Arising in Consequence of Deficient Nutrition," Dr. H. C. Bloch, of the University of Copenhagen.

"Milk as a Standard of Nutrition," Dr. C. Pirquet, of the University of Vienna, Austria.

"Vitamins in Preserved Milk," Dr. Cornelia Kennedy, of the University of Minnesota.

In all cities visited the delegates encountered scientists at work in feeding laboratories. In Washington Prof. Shaw visited Dr. Jones' laboratory at the Bureau of

Chemistry and was able to tell his co-workers about the American Institute's work on bread and nutrition, while they told of their work in feeding experiments with proteids.

In another part of Washington there was Dr. Goldberger's laboratories which had become famous because of Dr. Goldberger's investigation of the cause of pellagra. There was also Dr. Seidel's laboratories where he works, as he has for many years, to isolate the Vitamin B from yeast. He had as many pigeons as some of the other laboratories had albino rats on test feeding experiments. Dr. Hoagland was also found at work with test animals—determining the vitamin content of eggs and meat.

McCollum at Baltimore

In Baltimore Prof. Shaw found Dr. McCollum in his laboratory. He did not need to be told of the work of the American Institute to carry his work through each problem of the baking world for he had come personally to visit the laboratories the baking industry has set up for research work. He extended every kindness to his colleagues from other fields who came in great numbers to visit him.

Some glimpse of the world-wide development of scientific dairying was afforded when American scientists gathered at the New Willard Hotel for the grand banquet of the congress. Representatives of forty-seven different nations answered to the roll call and as each delegation was introduced, the band played the national anthem of the nation from which the delegates had come. It was described by Prof. Shaw as one of the most dramatic experiences of the convention.

And so the progressive journey continued until the final ending in Syracuse. The baking industry obtained from this great occasion a content and an inspiration which will last it a long time.

In all there were associated to make this

one industrial gesture to the world a huge success, thirty-one American organizations within the dairy industry, eighty-three educators from American universities and colleges, twenty-five breeders of dairy cattle, sixty-six manufacturers of milk products, 135 market milk producers, two feed manufacturers, thirty-six machinery and supply firms, and five trade magazine publishers.

They brought together as official delegates groups from the Argentine, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Costa Rica, Cuba, Czechoslovakia, Denmark, Dominican Republic, England, Finland, France, Guatemala, Hungary, The Irish Free State, Italy, Japan, the Netherlands, Norway, Paraguay, Poland, Persia, Rumania, Russia, Salvador, Spain, Scotland, Sweden, Switzerland, the Union of South Africa, and Uruguay.

Haller's Sales Problem

WHAT'S to be done about deliverymen who take their training in one shop and attempt to capitalize it by taking an increase in pay from a competitor who expects to use them over the same route?

One of the bitterest feuds in our industry lies in a section where one bakery foreman quit work in a large plant to start up for himself, after first making a deal with the firm's delivery salesmen to "go over with him." These men started on their old routes for a new bakery and their former employer never forgot nor forgave them or his former foreman. It seemed to him a faithless kind of proceeding and the turning against himself of resources and experience he had placed within the reach of those who sought his undoing. "It is as if they came to borrow bullets with which to shoot me down," this baker explained to his friends. And the resulting feud has run its course through many years.

In a city of the Far West, a fire swept an established bakery out of business, along with the rest of the town. While its proprietor was busy operating a free soup kitchen for the good of all, one of his employees hastily set up a bakery for himself. The people of the town took charge of that case. They said they would not see the self-forgetful citizen who rose to the requirement of the fire-crisis, harmed in any such manner. And the offending person was socially chilled out of town.

In Ohio, Fred Haller had such a case to handle. Two of his drivers attempted to sell their experience as Haller salesmen to a competing concern. Mr. Haller had employed them on contracts providing they would not attempt to do this kind of thing. Mr. Haller carried the case to the Court of Common Pleas in Lucas County, and obtained a decision forbidding the salesmen to solicit orders for any other baker within a period of six months following their withdrawal from the Haller company. This allows the employing baker, of course, plenty of time to break in new men on these men's runs. Result—no special value to their new employer.

Self Help in Trouble

LUCKY is any association which has in its membership men capable of "thinking through" in the terms of the whole organization's welfare. When some excited picnickers telephoned the police that a certain Chicago baker's cake had poisoned them, the police did not stop to think of the harm they could do this baker's business without an investigation first to determine whether he should be held.

The police took the picnickers' word for it and clapped the baker into jail. Then the Health Department started to examine the cake he had sold them. Along came Marshal O. Densby at this juncture. He

was president of the Chicago Master Bakers Association, and he knew the baker who was in trouble. He had such confidence in him that he proceeded to demonstrate to the police, the Health Department and the people of the neighborhood that the cake was wholesome. He did it in a manner that left nothing to guesswork, nothing to be desired. He ate some of the alleged poison cake—ate a great lot of it so that if there were any harm in it he would be sure to be a poison victim.

Densby did this for the good name of that baker, seeing that the concern of one was the concern of all. Then Densby stood for a whole day in front of the accused baker's closed shop. That was an object lesson none could dispute and the entire prosecution collapsed, in favor of a real investigation of *all* the articles the picnickers had eaten. In the spirit of Marshal O. Densby all the problems of the baking industry will one day be taken up.

Out in Honolulu

HONOLULU is so far away from some places that Americans are likely to forget it has bakers thrilled with the same impulses as occur in the rest of America. When a full page advertisement depicting the necessity for bakers to take note of the wheat situation, because of oversupply on the farms was prepared by Alex Taggart in Indianapolis, the Honolulu bakers received copies, along with the bakers of other American cities. G. S. McKenzie of that city called up five other bakers and all five co-operated in publishing the message in Honolulu's leading papers. Thus they helped to educate the people of their community on a vital American issue. "We hope" writes Mr. McKenzie "that with your help we were able to accomplish some little good both for the farmer, the miller, ourselves and the public."

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

Published by the
AMERICAN INSTITUTE OF BAKING
1135 Fullerton Ave., Chicago

Entered in the post-office at Chicago, Illinois, as second-class matter, under the act of August 24, 1912.

Price, Fifty Cents a Number; Five Dollars a Year.

OCTOBER 15, 1923

We Work Together

To win through quality production and the utilization of scientific research a welcome for two loaves of wheaten bread for every one that now finds favor.

The New Team Work

WHEN restaurant and hotel men, through officers of their national associations, meet with the authorized spokesman for America's baking industry, for the purpose of improving the quality of restaurant and hotel bread, great good for all must result. Many a man and woman obtain their impression of bakers' bread from public eating-places. If good bread is served to them they praise all bakers' bread in general; if they receive poor bread they form a bad impression of all bakers' bread.

In many of these public eating-places the practice of "home baking" is indulged in; baking science has often run far ahead of baking practice in such places. The hotel owner, having no practical baking experience himself, has failed to buy the modern machines that protect the quality of the modern loaf. Now the hotel owner wants to know all that the American Institute of Baking has to teach him. At their last convention in Cincinnati the National Restaurant Association heard gladly the message of quality bread, as Dr. H. E.

Barnard stated it for American bakers; at the Toast Luncheon, reported elsewhere in this issue, restaurant and hotel men pledged themselves to put "eat it with toast" slogans on all their menu cards during Toast week. Here is a crowning triumph for industrial co-operation that will be duplicated scores of times, as American bakers learn how to work in harness together as an all-American team.

Within One Lifetime

A REMARKABLE sight confronted the eye of Mark Bredin, president of the Canada Bread Co., when he gazed upon a bake-oven in the ruins of Pompeii. "Why that oven," he said, "is exactly like the oven at which I learned my trade in the north of Ireland."

Also the ancient oven was in all essential particulars exactly like the first oven that greeted the eye of Mark Bredin when he came as a poor immigrant boy to America.

Within the single lifetime of this immigrant boy, the American baking industry has leaped forward from the small "walk-to" bakery of his youth to such corporations as the \$6,000,000 Canada Bread Co., of which he is president. Mr. Bredin has grown with his industry, and has been one of the powerful factors working to drive it forward. We look for romance in things far afield from us—such as Fairyland. Some day we will look closer to home and see much to enrich the literature of our land in careers such as this particular one.

How Was It Done?

HOW was this remarkable rise of the baking industry brought about? Mr. Bredin's company probably has a hundred devices for controlling fermentation to one that his fathers knew; it has drawn upon scientists for laboratory knowledge, gained

through the experimental method of searching out truth.

In this particular the baking industry is only one of many that have moved forward with express-train speed. Our sister industry, that which handles milk, has moved even faster. It's "World's Dairy Congress" had the honor of accepting an invitation from the United States government that the government print its proceedings as an act of courtesy.

Why? Because the government recognized that men of science were contributing most of the program, and that scientific handling of milk was the one safe way of obtaining safe milk.

"This congress has no legislative authority," said H. E. Van Norman, its chairman, as he called it together. "It has been made possible by the financial support of the government and the dairy industry. It will serve its adherents if it brings into wider use the best fruits of scientific research and if it increases the appreciation of the part which fundamental scientific research contributes to economic progress.

"We of this country are indebted to Europe for our breeds of dairy cattle, early feeding standards, and our elementary knowledge of dairy bacteriology, the pasteurizing process, the use of pure cultures, the centrifugal separator, and leadership in co-operative organizations."

A Bust of Pasteur

NO LESS than the dairy industry the baking industry owes to Europe some of its greatest benefactions. If Louis Pasteur made the dairy industry possible by giving it a means to control bacteria in milk, he no less made the modern baking industry through discovering the nature of yeast, and the fact that it could be grown in a medium outside of dough. Our processes of fermentation control, the develop-

ment of yeast foods, and the smooth manner in which modern dough mixes turn out uniform bread at all times, are but applications of the Pasteur discoveries.

On August 10, 1884, Pasteur visited Copenhagen as a guest of the International Medical Congress, whose members were just becoming aware that his discovery of the nature of yeast was making him the father of a new scientific medicine. He found a street, Pasteur Street, already named after him at Carlsberg, and a beautiful bust of himself by M. Paul Dubois gracing its approach to the Hansen Institute of Fermentology.

It is planned to bring a bronze replica of this bust to the American Institute of Baking, and install it with due honors. When the plans have been carried out, men of our sister industry, the milk industry, will no doubt gather to help us dedicate the statue to one of mankind's greatest benefactors.

At Our School

ALAD from Honolulu, and another from England mark the range of sources whence came our students for the present baking course. In the School of Baking work thought sufficient until a very few years ago, no longer suffices. The thirty-odd students now at work will graduate as "Bakery Engineers" in a more general meaning of the term than was thought to be applicable to bakery service prior to 1923.

The latest applicant for information about our School of Baking is T. M. V. Kannuswamy Pillay of Theradikadia Street, Teppakulam Post Office, Trichinopoly, Madras Presidency, S. India. He saw the advertisement of the school in *Bakers Weekly* and hastened to ask for an application blank and costs of the course.

From a Restaurateur

ONE of the big tasks of the American Institute of Baking is to carry the message of better bread and more uses for bread to every open door. Dr. H. E. Barnard spoke on bakers' bread before the Cincinnati convention of the American Restaurant Association. A restaurant man caught the ideas thrown out, returned to his home bakery, and wrote this letter about his subsequent experiences:

"Dear Dr. Barnard:—

"Upon my return from the American Restaurant Association Convention at Cincinnati I took up the question of the amount of toast we have been selling with my manager and found the following results; up to one and a half or two years ago we were making our toast in the kitchen. At that time we purchased a large automatic toaster which we placed on our counter during breakfast so that the customer could see us make the toast. During the time we made the toast in the kitchen we used about five or six loaves of bread; at the present time we are using between twelve or fourteen loaves. So you can see from this that we have more than doubled our sales on toast for breakfast.

"The following is an experience that I would like to have you know about. We had on hand a lot of sardine paste and some French goose liver, which we had tried to sell by making sandwiches with untoasted bread. Neither one of these items seemed to sell in this manner and I suggested that we use toasted bread and see whether we could not get rid of the goods in this way. We tried this out and in a very short time we sold both items. In fact they sold so well that we will continue to handle the Sardine Paste right along.

"As a result of this experience we have begun to make hot toasted cheese sandwiches, and the first noon meal we had this

sandwich on our steamtable we sold over one hundred orders with a good deal of favorable comment. The sale of toast from this one item has opened our eyes to the fact that the public will buy toasted bread if made up in different ways, and we are going to run toasted sandwiches through the entire winter months, something we have never done before. No doubt as we get into the winter season when people begin to want jams and jellies, we will try out some sort of toasted sandwiches with these.

"I am giving you these facts because I would like for you to have them as you were the first one to call my attention to what you were trying to do with the toast situation, when you were in Indianapolis some months ago.

"Thanking you for the co-operation you have given us in the past, I am,

"Very truly yours,

"HUBERT H. KELLER, Pres.

"White's Restaurant Company."

Poems in Stone

THERE probably was never such a highway built in America as the Columbia River highway, which carries motorists up to the very heart of the Mt. Hood wonderlands. And there probably never was a poet who dreamed such poems in the form of highway stones, as Samuel Lancaster does. Lancaster imported the sons of ancient Romans who were adepts in laying the "dry masonry" of Roman roads, to build dry masonry walls along the Columbia River's mightiest gorge.

These Italians promised him that their sons' sons, if they came to America, would never be ashamed of the walls they were creating without mortar or cement. As Mr. Lancaster pointed out to a visitor from the American Institute, the wonders of these self-draining walls, through which

the seeping rains flowed freely without dislodging a particle of stone, another marvel came into sight. It consisted of a pair of Indians, who were sons of the wild chieftans once inhabiting this gorge. In the hand of one Indian was a package—containing four loaves of wrapped bakers' bread. The Indian now operated a fish trap, but he sent his fish away to market and bought bakers' bread on the profits returned. A bread wagon, bounding along at full speed over this marvelous mountain highway, was carrying bakers' bread to each of the river gorge's little hamlets from The Dalles to Portland.

Samuel Lancaster has now gone into Utah's southern wonderland, known as "Zion Park." He is building another highway into a marvelous mountain paradise. What bread wagon will first carry wrapped loaves over it to its white inhabitants, and to the wild Indians who still roam through some of its box canyons and mountainous plateaus?

Two Meetings

WHAT would the scientific causes of America amount to if there were not frequent meetings between all those interested in them, to gain the vision and a sense of direction in which to drive them forward.

A baker of Portland, Ore., was astonished recently to find his name called out by a passer-by in Ontario, Canada. "I cannot forget you," said the Canadian, "for I remember every word you said in Washington when you and I were both on the Wheat Conservation committee, and your ideas helped my country as much as yours. I used to call you Americans cousins, now I call you brothers."

"And I cannot forget you," replied the Oregonian, "for I recall how your ideas about the Canadian wheat crop guided our

actions as much as our ideas did about the Oregon and Washington crops."

Thus two bakers who had helped in war work together found they had gained a fellowship to carry forward through the rest of their lives. With the American Chemical Society meeting on baking problems at Milwaukee just when the American Bakers Association was meeting on the same problems at French Lick Springs, new fellowships of this kind sprang up in both groups. They will make it easier for all time for the two groups to work together in closer fellowship and harmony.

Ovens and Ovens

O VENS for drying lumber have still to be developed. Such as exist give infinite trouble of just the kind the bakers' oven "peel" was developed to take care of. But "peeling" ovens filled with lumber is a different story from peeling ovens filled with modern bread pans. Therefore chemists serving the lumber industry have been put to work to solve the problem of oven-development.

One of these chemists, B. B. Coyne of the Morley Chemical Laboratory, Western Reserve University, has included a study of all types of baking ovens in his researches. At the American Institute of Baking he made many inquiries as to the adaption of the principle of the traveling oven to bread baking. It is by no means impossible that this principle may spread from the bake room to the lumber mill and solve as great a problem there as it has in bread manufacture.

I would greatly appreciate being placed on the regular mailing list of BAKING TECHNOLOGY. I have seen some numbers and think very highly of them.

—M. E. JAFFA, College of Agriculture,
University of California.

The Use of Milk in Bread

It Affords an Easy Means of Utilizing Valuable Food Products Now Wasted

By R. M. ALLEN*

Director Research Department, Ward Baking Co.

ALL workers in the field of nutrition have demonstrated the superior food value of whole milk and whole wheat combined. Milk supplies a better balance to the wheat than meat; butter, a better balance than other fat.

Whole wheat is rich in phosphates, but very low in lime, sodium, and chlorine, or sodium chloride, ordinary table salt. It is rich in vitamin B, low in vitamin A. From a mineral salt standpoint it requires additional lime and table salt to put its other valuable mineral salts into a balance form for proper nutrition. Thus, white flour with its cheap and valuable proteins and starches, whole wheat with its valuable iron, phosphates and other salts, lacked calcium and other food needs which we sought to determine.

In respect to proteins, the wheat germ contains a different kind of protein from that in the white flour, and milk contains still a third form of protein. When these three are combined, better results are assured than when used separately. The wheat germ, in addition to being high in potassium phosphate, contains a large amount of another substance, namely, vitamin B. This is the vitamin found in yeast. On the other hand, milk, while stable in the important vitamin A (associated with butter fat), varies in the amount and strength of vitamin B contained.

After determining the mineral salt, soluble protein, and vitamin B value of wheat and bran, the next problem was to put it in the most palatable form for food. A whole

wheat loaf made with milk and some additional soluble calcium salts and table salt was the simplest combination. However, consumers do not like to eat this loaf of bread every day. Furthermore, the salts and vitamins in the bran are not in a form readily assimilable by the human digestive system. To unlock the nutritive properties of bran and germ and add them to white flour to produce a nutritive white bread resulted in the extraction of the solubles from the wheat germ into a standardized extract rich in vitamin B.

After adding the wheat germ extract and milk the loaf was still deficient in calcium salts. Doctor Sherman, of Columbia University, fed white rats a diet consisting of two-thirds whole wheat and one-third whole milk powder. The large amount of whole milk was necessary to get enough vitamin B and secure a calcium balance. While these proportions will not bake up into a palatable loaf of bread, sufficient milk can be used to add liberal amounts of vitamin A, and to produce a protein balance, the calcium deficiency can be remedied by the addition of salts direct and the vitamin A deficiency supplied with wheat germ extract.

Tests in this loaf have been conducted in seven different laboratories with the independent conclusions that animals fed on the bread as a sole food show normal growth and reproduction, while those fed on ordinary bread show decline and death.

The nutritional value of the loaf is shown by charts of these feeding tests. These charts give the normal growth curve, the growth curve from feeding the loaf and

* In an address before the World's Dairy Congress at Washington, D. C.

the composite growth curve from some of the most popular breads on the American market. The charts speak for themselves. No such complete growth curves have ever before been recorded for a single food where the test animals are carried on into adult stage. Hundreds of these animal feeding tests have been made; in some cases animals have been carried into the seventh generation of reproduction on the bread and water alone, each generation normal in growth.

The loaf is made up of the following ingredients: (a) Wheat flour; (b) an extract rich in vitamin B, soluble proteins and mineral salts from wheat germ and bran; (c) whole milk as the only liquid, plus added whole milk solids, including the vitamin A and milk salts; (d) soluble calcium salts; (e) the usual leavening ingredients, including yeast, salt, shortening, and yeast food. The shortening is, besides butter, selected beef oleomargarine.

The nutritional facts, based upon the standards of Sherman and others and upon actual feeding tests, show that the loaf contains (a) proteins of superior food value and of adequate amount and balance for normal growth; (b) liberal amounts of vitamin A and B; and (c) a well-balanced variety of body-building mineral nutrients.

Arrangements have been made, under competent direction, for the feeding of the loaf to children in institutions and private homes, one group receiving the loaf as their sole cereal food in addition to the average diet of other foods, the other group receiving the same diet with the exception that ordinary white bread and cereals are substituted for the loaf.

The results already confirm the conclusions derived from the animal feeding experiments. Groups receiving the loaf as part of their diet are making uniformly greater gains in height and weight than children of the same age and nationality,

and under the same observation, whose diet contains ordinary cereals and ordinary white bread. From the general average of over a thousand of such children the results indicate that a loaf, such as this, is one dependable and economic means to combat undernourishment among children.

Need for Legislation

Now that we have found that whole milk can turn whole wheat into a balanced food, state and federal regulation should require a standard for milk breads or require the amount of milk to be stated where milk is claimed.

This can be done in two ways: (a) By specific statutes, and (b) by regulation under general and existing statutes. The first question is to determine the amount of milk to be required before a loaf may be called "milk bread." The second question is what descriptive terminology shall be allowed when skimmed milk solids are used.

In 1906 an arrangement was made whereby the committee on food definitions and standards, appointed by the Association of State Dairy and Food Departments, and the one appointed from the Department of Agriculture, the Association of Official Agricultural Chemists, were combined into one committee of nine. This committee promulgated in 1922 a standard for milk bread requiring that at least one-third of the liquid content shall be whole milk. It will be recognized that this was a low standard, but it was also felt that if this standard could be put into effective operation it would pick up a large amount of whole milk solids, and that the standard could be increased with the movement for standardization of milk bread once in motion.

Dairy-Baker Agreement

In the event it is possible for the dairy and baking industries to reach an agreement on this with the government officials and based on the results from nutritional

studies, the amount of milk contained in the loaf in order to be sold as milk bread can be written into federal and state statutes. Where a standard has been arrived at as a perfect finality it is far easier of enforcement when written into statute. But if the amount of milk can not be agreed upon, then the United States Department of Agriculture and the States should be given more specific authority for adoption of standards giving the amount of milk to be contained in milk bread. The dairy industry because of experience in litigation over standards and the change of standards with changing administrations will prefer the statutory standard. If such a standard is formulated and written in the statutes, the industry should see that it is uniform throughout the States, since bread is entering more and more into interstate commerce and a milk bread legal in one State should be equally legal in another.

Butter for Vitamin A.

The proteins and salts separated in the production of butter splendidly balance the proteins, salts, and carbohydrates contained in the wheat. It would greatly increase the nutritive value of bread if all of these solids and salts separated in the production of butter could be used in baking. But in order to do this some terminology must be devised which will point out the increased nutritive value to the consuming public and at the same time not trespass upon what the consumer has a right to expect when the term "milk bread" is used. Skimmed milk solids contain valuable proteins, salts, lactose, and everything that the milk contains except the fat and vitamin A. Animal feeding tests with a bread made with skimmed milk solids would show a decline because of the absence of vitamin A, whereas the addition of butter fat to the diet would change the growth curve into a continuous and steady upward trend.

But when added cost is added to a loaf there must be some way by which the added nutriment can be accurately described to the public and the public brought to pay for the necessarily increased cost.

If the control of milk bread is handled through standards it can be handled by regulation by adding a clause to section 3 of the food and drugs act of June 30, 1906, investing the Secretary of Agriculture with the power to make the necessary rules and regulations with a provision for the proper standards to be applied in the making of milk bread.

Advice from a Woman

NO speaker at the French Lick Convention, American Bakers Association, was better received than was Miss Anne Pierce. On returning to New York, where she presides over the Tribune Institute, she published an appeal to the housewife to take a real interest in her baker, and make all her ideas of what she wants in a loaf of bread known to him.

This means that the baker must draw his mind away from his bread to his customer and reciprocate all her spirit of interest and friendliness. Miss Pierce addressed the retail baker particularly when she said:

"Talk to your baker, all of you who are feeding a family. Let him know you are interested in the bread you buy, what you like, and want, and why. You will find there is more to bread than you ever thought, although you know it is the most economical supply of energy and body-building material that we have. Supplemented by milk and a leafy vegetable it offers a complete ration. Made of the whole wheat with added milk, raisins or figs, it takes on vitamin value and completion within its own crusts.

"Always economy is to be added to its virtues, and variety may be if the toaster,

the baking-powder products and sandwich combinations be remembered."

No *entente cordiale* will pay you bigger interest than that established with the folks who sell you foods. Talk things over with them—you will find a mutual understanding profitable.

Toast for Breakfast

WITHOUT in any way depreciating the value of the "Eat More Wheat" campaign which has been supported so generously by the millers, we can see so much more of interest in the "Make Toast Your Breakfast Food" campaign which is being handled by L. A. Rumsey of the American Institute of Baking, that every salesman interested in the welfare of the baking trade should get behind it.

Make Toast Your Breakfast Food is a logical thing to do. A study of the breakfast food situation conducted by a committee of the American Bakers' Association, showed that bread had practically disappeared from the breakfast menu in favor of the prepared cereal foods costing many times as much as bread. It was further found that continued use of an electric toaster meant always a third to a half more bread consumed as toast by that family. Space will not permit a long discussion of the other amazing facts brought out.

Hard work has been done at the Institute to secure real co-operation from manufacturers, jobbers, and retailers of electric toasters on this campaign and you can assure every baker that he won't be doing it alone when he attempts to make Toast the American Breakfast Food. A folder entitled "A Brief Prospectus of Plans for the National Make Toast Your Breakfast Food Campaign" is available to all those interested on application to the American Institute of Baking. Get them and hand

them to your customers. You will be doing them a favor. —From *The Mersogram*.

Mold on Unwrapped Bread

THE dust of modern city highways is a bad medium through which to haul unwrapped bread, it has been determined by experiments performed in Leeds, England, by P. Hampshire, F. R. M. S., lecturer on bacteriology at the Leeds Technical School.

Mr. Hampshire obtained from a grocery store two loaves of bread from the same baking. One had made its journey to the grocer's wrapped, and the other unwrapped. They were carried in the same "van" across England's great northern industrial city.

From the surface of each loaf Mr. Hampshire cut a small piece of crust and incubated it to develop its coating of wild yeast and bacterial and mold spores. The crust from the wrapped loaf developed no bacteria or molds at all; the crust of the loaf that had made the journey unwrapped, was literally covered with black and blue molds.

Mr. Hampshire then took scrapings from each loaf, and incubated them after wetting with sterile water. From the wrapped loaf the scrapings developed only one mold colony, while the scrapings from the unwrapped loaf developed fifteen bacterial colonies and two colonies of mold.

"Dust is the baker's deadly enemy," writes Mr. Hampshire in stating his conclusions for the *National Association Review*. This fact was discovered first in a brewery by Louis Pasteur, and was applied in a hospital by Joseph Lister, with revolutionary effect on the death rate. Now it is becoming the slogan of bakeries as well, and *dust* elimination looms as the most important phase of modern bakery sanitation. The conclusions at Leeds are exactly similar to conclusions reached from similar experiments by Harold M. Turley at the American Institute of Baking.

Our Non-Rancidifying Oils

How Scientists Have Succeeded in Producing Vegetable Shortenings of Solid Consistency Through Hydrogenization of Oils

By M. B. GRAFF

IN every industry men are gaining a foothold who know not only the merchandising end, but the chemistry and bacteriology of each process involved in the making of their product.

At a recent convention of meat packers, delegates listened intently to a paper read by a chemist employed in a tannery. He told how the hide should be handled while still in the packer's hands, so that it would arrive at the tannery in the best condition for manufacture into leather. In the milk industry Washington Platt knows much, and has a rare facility for imparting it to others. In oils David Wesson can teach our industry to advantage, and has in the columns of this paper. In the matter of lubricants Allen F. Brewer has taught readers of this paper valuable lessons.

It has been the plan of Dean C. B. Morrison of the School of Baking to arrange for talks to our students by persons having special knowledge of some one phase of the baking industry. Among those who have spoken to the students is M. B. Graff, specialist on vegetable shortenings. He was invited to arrange his address for publication; it appears herewith.

Since the earliest biblical times the people of all countries of Europe and Asia have been familiar with the use of certain vegetable oils in the human diet. Olive oil, particularly, has been famed for its service to mankind. But there were many other kinds of oil which could not be used for one reason or another.

Perhaps a strong, unpleasant odor rendered them unpalatable, or they were asso-

ciated with other substances from which they could not be economically disassociated. These oils awaited the arrival of the chemist, who could so refine and purify them that they would be acceptable for human consumption. As our great cotton crops in America continued to increase, in order to yield us clothing, the cottonseeds grew in volume as a waste product, although richly freighted with a good, serviceable oil. All that was lacking was the skill of a refiner, plus an equipment suitable for his purpose. These were at last supplied through discovery and invention, and cottonseed oil took its place in commerce.

At first it was looked down upon, but it sold at a low price as a substitute for the much desired, but expensive, olive oil.

In countries where olive oil is a regular product for everyday use it is perfectly natural that it should be used as a shortening. In our country the use of solid shortening had been an established habit for many years and it was not easy to make a change. The difficulties encountered in using the liquid shortening caused it to fail of much popularity although at the time its price was interesting. Even today many pastry bakers find difficulty in working a liquid oil, and rather than change their methods will continue to use a fat that is solid.

The value of vegetable oil as a food product was readily recognizable. The cleanliness of origin, the ease of handling in a sanitary manner, and the extreme state of purity in which it could be supplied, made it popular. Its high rate of

digestibility, as shown in government and other tests, added to the evidence of its value. The addition of this great quantity of valuable material to the food resources of the country became of the utmost economic importance and was of tremendous consequence during the world war.

Altering Its Consistency

The next step necessary was to convert this material into a physical consistency that should meet the popular demand. Something must be done to it which would convert it into a soft solid at ordinary temperatures; something that would make it mix with flour readily for pastry or biscuits, and allow the mix to take up the proper amount of water to give a good light, flaky product. Oil might be made to work but with variations of procedure which were not readily adopted. It was simpler for the manufacturer to meet the popular demand than to change the demand.

The logical procedure was to add a solid fat to the oil to produce a stiff material and the most convenient material at hand was beef or oleo stearin, a hard product of the packing house. This made a good outlet for both products. This was the popular lard compound for a number of years and is still largely used. It may be put out in various conditions with or without the admixture of air to produce a certain whiteness and consistency, but it is still a compound of a liquid vegetable oil and a solid animal fat. The word compound is not used in a chemical sense.

Then about some twelve years ago the process was developed of hardening the liquid oil by chemical action. In this way the liquid oil was completely converted into a solid fat. By carrying this process almost to completion a solid fat, known as vegetable stearin, was produced which

was even harder than oleo stearin. With this development it became possible to produce a strictly vegetable compound by mixing this vegetable stearin with the liquid oil, properly chilling and beating to give it a satisfactory consistency.

These are properly called compounds for they are compounded from some 80 per cent to 90 per cent of liquid vegetable oil with 20 per cent to 10 per cent of solid fat either animal or vegetable. All characteristics of the vegetable oil are still present in the 80 per cent to 90 per cent, although the consistency may be unsatisfactory, for that portion is chemically unchanged.

The chilling is generally done on a revolving, refrigerated roll which takes up a thin layer of melted oil and in one revolution partially solidifies. It is then scraped off into so called "picker boxes" where it is beaten up to make it uniform and aerated to a greater or less extent and then run into packages before it has time to solidify completely.

Help from the Chemist

The next step hit upon by the producers of vegetable shortening, with the process of hardening, or hydrogenation, as it is called, at their command, was to carry the process only so far as to produce the soft, plastic solid desired. This produced a material in which the characteristics of the vegetable oil were changed, and yet by maintaining a hardness low enough to readily melt at body temperatures, it retained all of the digestibility and nutritive value of the oil. The value of this product was immediately recognized, its popularity grew very rapidly and it became a household favorite. The fact that the entire mass of oil has been treated and changed should be borne in mind as distinguishing such a product from a com-

pound in which a large proportion of the oil exists in its original condition.

The chemistry involved in those relations is very simple and with a few formulae can be made perfectly clear. The production of the reactions has not been as simple as the explanation of the relations.

Problem of Fatty Acids

The edible oils are made up of a combination of glycerin with certain fatty acids. The glycerin is common to all. The variations in the characteristics are largely due to variations in the fatty acids. Some of the fatty acids are solid and some are liquid. In most of the facts the solid fatty acids are stearic and palmitic. The liquid fatty acids are chiefly oleic, linolic and linolenic. There are others present in many cases, but they are in small proportions and chiefly interesting from a chemical standpoint.

The simple chemical formulae express the number of atoms of the three elements which make up the fatty acid and may be tabulated as follows:

SOLID FATTY ACIDS—

Palmitic acid— $C_{16}H_{32}O_2$

Stearic acid— $C_{18}H_{32}O_2$

In these acids the relation between carbon (C) and hydrogen (H) is such that the carbon has all of the hydrogen attached to it that it can hold. The oxygen (O) is the same in all. The palmitic acid has less carbon and less hydrogen. In these we say they are saturated. Now look at the

LIQUID FATTY ACIDS—

Oleic acid $C_{18}H_{34}O_2$ = Stearic acid less 2H.

Linolic acid $C_{18}H_{32}O_2$ = Stearic acid less 4H.

Linolenic acid $C_{18}H_{30}O_2$ = Stearic acid less 6H.

They are said to be unsaturated.

For many years the method of econom-

ically adding the hydrogen to the molecule which would convert the liquid fat into the solid fat was a hidden secret. Today it is a matter of common knowledge to the oil chemists, that, under proper conditions of temperature, contact and purity, it is a very simple matter for a very minute quantity of finely divided nickel, called catalyzer, to cause hydrogen to unite with the liquid fat and produce a solid fat. The catalyzer plays the same part in the reaction that a preacher does at a wedding,—“he is very essential to the consummation of the union but he does not enter into it.” The nickel does not enter into the fat and is very readily and completely removed.

The oil and finely divided, reduced nickel are mixed in a tank by agitation, heated by means of steam coils, and hydrogen gas is mixed with them. The intimate contact of oil, gas and nickel catalyzer produces the desired results. The liquid oil is gradually solidified by the addition of hydrogen. When the reaction is completed the nickel is removed by filtration and the fat further purified to obtain a neutral, odorless, tasteless product.

By this method the less saturated acids are converted into saturated acids.

Another relationship which is quite familiar to most of us, without realizing just why, is the fact that oxygen can be added more readily to these unsaturated fats than hydrogen can, and this really takes place in everyday life. We are all familiar with the fact that linseed oil in paint and varnish gets sticky and then gummy and when given a good chance gets very hard. This is due to the fact that it contains very unsaturated fats and readily takes up oxygen from the air. The other liquid oils do the same thing to a less extent, but at the same time get quite gummy. Those familiar with cottonseed oil, even salad oil exposed about the opening

in the can, will recall a gummy condition accompanied with a rancid disagreeable odor. Those who may have left cotton rags about, which were well soaked with linseed oil or cottonseed oil may have been apprised of this tendency to oxidize readily by the spontaneous combustion which set fire to the rags and possibly to other things.

This tendency is measured quantitatively by the chemist in terms of the amount of iodine which is absorbed in the same place and same atomic proportions as the oxygen and hydrogen and lends itself to more accurate measurement.

The following table shows the relationship between some of the vegetable oils and products as expressed in iodine value.

Kind of Oil.	Iodine Absorption.
Linseed oil	175—180%
Soya Bean oil.....	135—140%
Corn oil	125—130%
Cottonseed oil	105—110%
Peanut oil	90—95%
Olive oil	80—90%
Compound	85—95%
"Crisco"	75—80%

These values do not cover the entire range of iodine value for any of the oils but may be considered as fair average figures and are partially indicative of the relative oxidizing tendency.

The Newer Products

Now what is the significance of these figures with regard to the food value and their use as shortening? The oils themselves when carefully refined and purified are highly digestible and nutritive. Where exposed to the air the readily oxidizable ones are converted into material which is very disagreeable and probably very much less digestible. This is particularly so when exposed in a thin film, as would be the case when distributed on the fine particles of flour in baking. This is of less importance in a piece of goods which is

consumed very shortly after baking. It becomes of prime importance in a product which may be kept for a considerable time before being consumed. This would be very serious in a cracker. In a cookie there might be sufficient sugar to protect the fat from exposure to the air, but the danger of oxidation is still there. For safety's sake, under any condition, the less readily oxidizable vegetable shortening is much to be preferred.

To sum up the matter, the vegetable oils occupy a very important position in the shortening field. The use of the process of hydrogenation has made it possible to produce a vegetable shortening of practical consistency and with the tendency to oxidize and become rancid reduced to a minimum.

Yeast and Diabetes

AN EXTRACT of yeast that may take the place of insulin, the specific for diabetes, is reported to have been obtained by L. B. Winter and W. Smith in the biochemical laboratory at Cambridge.

Great similarity to the pancreatic extract for treating diabetes, which was isolated last year at the University of Toronto, has been shown by the newly discovered solid substance from yeast.

According to their preliminary report, "When a solution of this substance is injected into rabbits, a very definite lowering of the blood sugar occurs, in every way comparable to that which we have found after injections of insulin."

A Saskatoon View

I THINK the work of the American Institute to clarify the cause of mold is very good. Its bulletins on this subject are very useful to millers as well as bakers.

—F. Z. MARSHALL, Saskatoon, Sask., Canada.

Baker and Grocer Together

Things They Can Accomplish by Closer Co-operation and Mutual Understanding of Each Other's Work

By H. C. BALSIGER

Secretary, National Retail Grocers Association

THERE comes from the grocers' world a word of complaint against bakers—a word of caution lest bakers let the grocers go too far out of their fellowship, and, in letting them encounter evil ways unaided, let themselves at the same time suffer evils they had not thought on their horizon.

One middle-western baker tells us that out of 103 grocery stores he sold bread to five years ago, he is only selling thirty groceries now. No other baker has cut into his trade. The grocery stores have disappeared. Chain stores have cut them out.

What shall bakers do about this encroaching element in the baking situation? In the middle-western case mentioned, the chain stores sold bread below cost as a "puller," and could afford to do it as they had so many high-profit items on which to recover the loss on bread.

H. C. Balsiger feels there is work for the bakers to do, operating through a common spokesman at the head of their organization, to help the grocers maintain their role in American life. He was invited to set forth what he had to say in this magazine, and before the French Lick Convention. Here is the message he has for bakers:

A baker's production may be perfect, his advertising may be wonderful, and his delivery and selling service may be everything he can expect it to be; yet he may fall miserably short of enjoying the actual consumer use which his efforts justify.

Does the retail grocer know as much

about bakery products as he should? Does he believe in them as he should? Is he really "sold" on them? Is he "sold" on your ability, as bakers, to produce a loaf which he, in turn, will offer with pride and confidence to his patrons—the only real ultimate customer you have got? And, finally, does he understand and fully appreciate the business-building opportunities and profit-producing possibilities which the steady sale of good bakers' bread affords him?

Advertising alone does not create in your dealer this interest, this confidence and this knowledge of your product. Neither is it brought about altogether through your being a good fellow. Building into your business those elements which answer all of these questions is a process that comes only after years of study and effort. Everyone of them, however, is essential, and must not be overlooked in order for a wholesale bread baker to enjoy the proper distribution of his brand to the ultimate consumer.

If the retail grocer does not believe that you are in position to produce a superior loaf, he is going to "fall" for every offer to stock, and push a cheaper product at a saving in price. It is undoubtedly most important for the retail grocer to know the difference between a really good product and an inferior one; and if he knows the difference and is actually "sold" on your product and your policy, he will become a selling agent who will properly represent you when the sale is made.

Manufacturers are today realizing more than ever before that the psychological

moment for their product comes at the time when the customer is up in front of the retail counter, ready to buy. Whether the result is positive or negative depends altogether upon the capacity and the mental attitude of the man behind the counter. All your productive, sales and advertising effort culminates then and there. If the man is "sold" on your product he will "sell" it to his customer. If he is not—he is in a very formidable position to switch the sale onto some other brand.

You may say that people are in the habit of getting what they ask for, and that, if you advertise effectively, substitution of this kind will not amount to much. The fact remains that it does—as all of you know.

About Our Institute

And when we take into consideration the diversion of a sale to a cheaper loaf, we all know that the whole industry is affected. Generally speaking, on most markets, a fine product is available, **but every poor loaf which is being offered for sale develops resistance which is a handicap to the fullest development of your industry and greater consumption of bakers' bread.** Does he believe in your product so that he recognizes it as an asset to his business, and so can intelligently contend for its merits against both the competition of the home-made loaf, and against the inferior loaf made by the indifferent baker?

These facts must be driven home to your retail distributors. You must appreciate the value of getting them to take sufficient interest to visit your plant—and then in turn getting their customers to do likewise. You may have tried it and you may be doing it continuously. On the other hand, you may not attach any value to it. In my opinion, it is something that a wholesale bread baker should never neglect to encourage and definitely promote.

Do you retail friends know what your great Institute is doing to help Bakers produce a better product? Do they know what you are doing to insure the purity and quality of your brand? Do they know these things so they may tell them to their customers and develop more confidence on the part of the public for the splendid product being manufactured by the wholesale bread baker today? If they do not know these things so they feel a thrill and take a real pride in selling your favorite brand, you have not properly "sold" them on your business or your industry. You really have a great story to tell, and the place to begin is with your retail distributors—the indispensable partner in your business.

The task of getting the enthusiastic interest of your retail distributor is manifestly more important than compelling consumer advertising. With a smashing campaign you can develop a certain demand which, however, does not and will not always produce results, on account of the fact that the dealer is often negative.

I am not arguing against consistent consumer advertising. I believe in it and think it is absolutely necessary. But consumer advertising without the dealer's support and interest is courting expense, rather than results commensurate with the expenditure.

Leaders at a Loss

Quite naturally, your retail distributor must have an adequate and attractive margin for the service which he renders for you.

There was a time—before we had chain stores, grocereries, cash-and-carry, etc., etc.—when all grocers were pretty much on the same basis. It was comparatively easy then to make a price with which every one was satisfied. Now conditions are different, and it is not so easy.

When a retailer takes your product and

sells it for cost, or for less than cost, as is often done, he is simply making a goat out of your brand. The minute he does this, he immediately places you on the defensive with your other distributors. They quite naturally conclude that you made him a concession, for the average retailer, who is working for a legitimate profit, does not figure that a right-minded person will sell anything at a loss.

Moreover, no one can sell any commodity at a loss—as a leader—without making it up on other goods. And that is plainly dishonest merchandising.

Therefore you are compromised in your relationship with your other dealers through the acts of an unreasonable or ignorant dealer who invariably goes broke through his tactics of attempting to operate a store without an adequate profit.

Moreover, from the consumers' angle, it has a decidedly bad psychological effect. When a ruinous price is made the house-wife figures that the cut-price must be the right price; and she concludes that the men who are asking the regular price are overcharging her or asking too much profit. She, too, does not for a moment consider that the cut price is below cost of production and distribution. Her mind doesn't work that way—principally because, no one figures that a merchant is in business to sell things at a loss.

When we talk of below cost—we mean invoice price of the product to the dealer, plus his cost of doing business. This is the only way that the cost of any article should be figured.

The wholesale bread baker undoubtedly owes his retail distributor protection against the competition of the man who sells below cost; and, if the wholesale baker—of his own accord—adopts a policy of not selling to a retailer when he resorts to such tactics, on his brand, he has every legal right to refuse to sell such a dealer.

The Chain Stores

Situations such as I have just mentioned often develop when a wholesale bread baker sells his brand to a chain store. A chain firm will buy bread from a wholesale baker, usually, only until they have enough stores to operate a bakery of their own. In the meantime, quite naturally, they take a popular brand and sell it at a cut-price, in order to create an impression in the consumer's mind that they are selling standard products cheaper than the independent retail grocers.

He may not give the slightest concession to the chain, but if the price is "slashed" the effect is the same as though he did. Friendly relationships of many years standing are often shattered through a situation of this kind—and only because the baker is tempted by the lure of a big volume customer, or the fear that he *must* sell him, which is not the case.

Raising Grocers' Standards

I want to give you an outline of what we are planning to do in order to inject into the retail food distributing industry something, we hope, will prove to be a fundamental approach to a solution of some of the ills confronting those engaged in the retail grocery business, as well as those who use the retail grocer as a distributor.

We have here an important economic problem to solve. A statement by Roger W. Babson covers the subject:

"Some say that there are a million too many retailers and the solution is to eliminate several hundred thousand of them. Perhaps so, but I seriously doubt if that is the proper way to solve the problem. Surely an army would not be strengthened by dividing it in half, and there are none too many retailers. It, however, is true that these retailers are not working efficiently. The solution of the problem lies not in eliminating a million retailers, but

in showing these retailers how they can work efficiently and how they can be of the greatest possible service. This is the great task facing the American business man today.

"The way to make independent retailers efficient and prosperous is not to decrease their numbers, but to raise their standards."

And that is what we are planning to do with the Better Grocers Bureau. It has a comprehensive program for the co-ordinated co-operation of all branches of the food industry to render the constructive service which is demanded.

The retailer's true function is that of serving as a purchasing agent for his community; as such he selects and carries a reserve supply of merchandise to meet the requirements of the individual customer. When the retailer enters business, he assumes the responsibility of performing a public function—that of economically providing commodities to his community, and of maintaining such environment as desirable to the consumers who support him. If he fails in this responsibility, he ceases to be an economic factor in the community which he serves.

Better Grocers Bureau

How can we expect the retailers of the country to perform these functions efficiently, under present conditions, with the hit and miss methods which have been in vogue only too long? With the constant influx of inexperienced men into the business—together with those men who are already operating in a way which is harmful to every legitimate merchant in the field?

Unless we increase the efficiency and prosperity of the average retailer, we will find the newer methods of retailing becoming stronger and stronger. And should the new methods, of so-called more direct distribution, ever get a strangle-hold on

the public, it does not take much imagination to conclude what the ultimate outcome will be.

On the other hand, if we can set up an agency which will function along the right lines, there is no doubt but that the tide can be stemmed. Through efficiency, the individually operating retail grocer can not only maintain himself as an economic factor, but his opportunities will be greater than ever, for he has many things in his favor—providing the inexperienced man is properly encouraged, and given a square deal.

He will become a better distributor for your products, and a more intelligent competitor. He will then conduct his business with real pride, with better profit, and with greater satisfaction to himself, as well as his customers, whose welfare, in the last analysis, is the determining influence in all transactions.

From a Health Official

I have read the articles you have published on mold and rope epidemics with great interest. The value of your journal to the baking industry and to those engaged in health work cannot be expressed in words. Copies of articles of special interest to the inspectors of food in this division have been distributed. I hope other food industries will display such constructive co-operation.

—W. B. DRENNAN, Chief Division of Food and Drug Inspection, Brooklyn, N. Y.

I AM inclosing check for our Association dues, and it is indeed a pleasure to send them in. During the last half year we have used every means within our power to further every progressive move instituted by the Association and only wish there were more members in this territory to coöperate with us. We believe in the Association.

—FRANCIS O. FERRI, the Condon Baking Co.,
Charleston, S. C.

Ancient Bread of Arizona

Samples Found in Cliff Dwellings Afford Interesting Studies for Smithsonian Expert

By DR. J. WALTER FEWKES

Director, Bureau of Ethnology, of the Smithsonian Institute, Washington, D. C.

THE SO-CALLED Cliff Dwellers, whose remains are scattered over the southwestern part of our country, were one of the most interesting groups of people that inhabited the United States before the coming of the white people. They were not a separate race but an adaptive condition, or, in other words, the pueblo or village Indians, who had been forced into the inaccessible canyons of the Rocky Mountains by a hostile people and had constructed their houses in caves in the cliffs. Wherever the Cliff Dwellers are found, there we find many natural caverns that man seized upon for his habitations.

The primary object which led him to these natural shelters was the storage of a bulky food supply, namely maize or Indian corn. In the country where they were found the winters, as a rule, are severe, and it was impossible for man to make long journeys even if he had been furnished with beasts of burden or other means of transportation. The cliff houses were originally built for granaries for the storage of their food and for protection, especially in the cold weather. It is the purpose of this article to give a short account of the nature of their food and its preparation.

The main food of the Cliff Dwellers was the Indian corn, a cereal that is generally supposed to have originated in old Mexico. It was originally a grass, which, through cultivation by man, had developed the characters and size it has fitting it for human food. This corn demands considerable preparation before it can be eaten. It has the advantage of not deteriorating by lapse

of time, and can be stored and used when needed; but with the exception of green corn it must first be reduced to meal, and the work of reducing it to meal developed a mill for that purpose. The preparation of meal naturally fell upon the Indian woman, who was cook and housekeeper.

The advantages of having a ready supply of food that can be used when needed are many, and the influences ready food has on the elevation of a people above savages are many. It is evident that a people who had a food supply that would last without deterioration had much time for other activities. If a group of people has to hunt or fish whenever food is necessary, almost all the time is exhausted in this way; but if it can draw upon a supply of corn, much time is released for other purposes. Moreover, the production of food necessitates the manufacture of implements to reduce the raw product to food. The corn must be ground and a special kind of mill must be invented upon which it can be reduced to meal; it must be cooked, which has led to the manufacture of pottery ovens and implements for that purpose. Many of the arts peculiar to an agricultural people or one subsisting on roots, grain or vegetables, owe their origin to the necessity for reducing the raw products to edible food. We find this law well illustrated among the Cliff Dwellers. Let us consider in turn some of the arts and industries affected, the kinds of food produced, and the different processes involved. First, the mill in which the corn was ground. In the great cliff houses of the Mesa Verde National Park,

Colorado, we find particular rooms devoted to this purpose.

The corn was ground on a flat stone set at an angle to the floor. This grinding stone, which has received the name of *metate* from the Mexican word *metatle*, is fitted in a stone receptacle made of upright stones called the *metateki* or *metate* house. There are generally three other *metatekis*, the *metate* of which have various degrees of fineness. The corn is at first ground on a rough *metate*, generally made of some volcanic stone, and afterwards on others of varying degrees of fineness until it is reduced to fine meal. Grinding of the corn is the work of the girls or the young women of the family, who kneel before these bins and with an oblong flat stone or *manos* do the grinding. It is customary to grind the corn, especially in summer, in the night time, and often as one approaches a pueblo he will hear the girls singing, as they grind the corn, special songs known as grinding songs which are among the most melodious known to these Indians.

Storage in Those Days

The corn is stored in bins, not ground until it is to be used. The meal obtained by grinding is put away in flat basket trays awaiting the second process or the cooking of the corn, which generally follows immediately. The Cliff Dwellers were familiar with several ways of cooking Indian corn, evidences of all of which have been found in the great cliff houses of the Mesa Verde. The most popular food among them is what the Pueblos call paper bread, a griddle-cake product like a Mexican tortilla, only thinner.

Generally the cook house is on the roof of the building and in it we find a flat stone set on four smaller stones and smooth on the upper side. Under this stone a hot fire is built. The batter, which consists practically of corn meal and water, is fried on this stone. First the cook smears it with

grease, generally a small woodrat, and then lays on the batter with her hand, spreading it out thin and allowing it to cook for a short time.

Good Cook a Personage

After it has sufficiently cooked she takes it off in sheets and lays it on a flat square basket. A good cook of paper bread is as marked a personage in a pueblo community as a chef in a hotel. These flat, generally square, sheets of paper bread are next taken and folded or rolled up into a roll, and are then fit for consumption. In eating it is customary to dip this coil into soup or stew, using it as a spoon; knives, forks and spoons being unknown to the cliff dwellers.

The color of this bread varies considerably. The most common is about the color of a hornet's nest. For ceremonial occasions we have among the Hopi bread stained with certain vegetable dyes, red, striped, black, and other colors. In the author's excavation at Oak Tree House, paper bread was discovered by him on the floor of a room eight feet below the surface of accumulated debris. Near it were found the stone upon which it had been fried, remnants of charcoal that indicated the fire, and a brush made of grass tied in a bundle, which the ancients used for two purposes: One end for stirring stews or sweeping the *metate* or grinding-stone, and the other end for combing the hair. This particular deposit of objects was connected with not only the frying of paper bread, but the mill on which the meal was prepared was not far away.

Ancient Hasty Pudding

A second kind of food made out of corn is what might be called a hasty pudding. This pudding is made on ceremonial occasions and is particularly enjoyed by the Hopi at the close of important festivals. One often finds where the solid rock comes to the surface of the ground within a cliff dwelling a round depression, carefully smoothed, about a foot and a half deep. This depres-

sion occurs in plazas of modern pueblos and is the oven in which the so-called party pudding is baked. This pudding is made of a thin batter of corn meal and water like the paper bread, to which is added home-made yeast which is not found in the latter.

Throughout the day of the festival ceremony one will notice a number of young girls in the Hopi pueblo, especially those belonging to the family of the priest, whose cheeks are distended and who cannot talk with anybody or answer any salutation.

Queer Source of Yeast

These girls are preparing the yeast, which is chewed by them and when sufficiently impregnated with saliva is realistically spurted into the jar of corn meal batter. Of course, girls with good teeth are chosen for that purpose, and the fermentation of the saliva and corn mush causes the lightness of the food.

On the eve of the day this hasty pudding is used fires are kindled in the ovens or depressions in the ground already referred to and allowed to burn until the sides of the oven are thoroughly heated. The ashes are then cleaned out and the oven lined with corn husks to receive the corn meal pudding. The whole is covered with corn husks and a circular stone slab laid upon it. A hot fire of grease wood is made on the disk. This fire is replenished from time to time during the night. All night this fire burns above the pudding, and if one approaches the pueblo after dark the fires illumine all the houses, making a most striking picture from the plains below. In the morning the fires are extinguished, the stone cover of the oven removed, and the pudding lifted out of the oven by the corn husks in which it is enveloped.

It is then ready to eat and is always one of the main viands in the great feast which closes the dance or other ceremonial dramatizations which are performed during the last day of a festival. The cliff dwellers'

hasty pudding, after cooling, forms a compact mass and is often recooked and eaten with great relish, especially with lamb and rabbit stews.

Names A-Plenty

There are many other varieties of food preparations made of corn meal which were eaten by the cliff dwellers, but there is probably no other people among the aborigines of America who had so many names for corn and corn meal. They have about twenty different words for maize, to designate corn in its different stages of growth, corn in mass, sweet corn, green corn, pop-corn, and the like; this variety of nomenclature being the result of the many years during which it has been under cultivation by men of different linguistic stocks.

Feast at Harvest

Perhaps the most striking of their many feasts with corn as a food occur at the harvest time when the corn is first harvested. The gathering of the corn harvest in the autumn is a social affair and the different clans celebrate a feast in its honor. In September when the corn is first gathered a large depression is dug in the ground and in this depression a fire of considerable magnitude is allowed to burn during the major part of a day and night, and early in the morning the ashes are raked out and the bottom of the pit lined with corn husks.

On these corn husks are placed a bushel or more of corn just gathered from the field, and above that another layer of corn husks. This is followed by others until the pit is half full and then on the top a fire is made and the contents of the pit allowed to roast throughout the rest of that day.

On the morning of the second day generally the covering of the pit and the corn husks are removed and the corn freshly roasted is taken out for the assembled clan. A corn feast follows, but before anyone eats any of the corn the oldest woman of the clan, who, in their sociological system is the

chief of the clan, takes one of these ears and standing over the pit raises it in turn to each of the four cardinal points, north, west, south, and east, saying a prayer of thankfulness for the bounty of the harvest. She then hands it to the nearest person. This act is followed by a general distribution of the roasting ears that are left and a subsequent feast upon them, generally accompanied by paper bread and sometimes by hasty pudding and the like foods. At the close of this feast the corn is placed in baskets and carried up the hill and stored away in the granary where it is kept corded like cordwood until it is ground and made into bread.

Anciently Recorded Way

Of the many minor ways of cooking corn there is one which is particularly interesting from the fact that it is the same described in the older accounts of the Aztecs of Mexico and which appears to date long before the Conquest. The corn meal is mixed with water, as in previous cooking, and spoonfuls of it tied up in packages about two inches in size, the covering being a corn husk, and tied together with fibre from the yucca. These little packets of corn meal are transferred to hot water and boiled for a considerable time, and are then taken out ready for the feast. This is a favorite food on ceremonial days, and although it has never been found in cliff houses, packages, the contents of which is all dried up, have frequently been excavated on the floors of some of the rooms of these villages.

It may be asked, how is it possible to determine the character of the food of the prehistoric cliff dwellers from the little data which we possess about them? And it may be said that the likenesses are so close between the cliff dwellers and the modern Hopi that we are justified in explaining the life of the one by the customs which have

come down from the time in which their ancestors lived in the cliff dwellings.

The particular piece of paper bread which is referred to in a former issue of the JOURNAL was found at a ruin called Oak Tree House, which is situated in the Mesa Verde park not far from the extraordinary ruin called Sun Temple. It is about a quarter-sheet of this material and although it is extremely difficult, of course, to determine after so long a time its exact constituents, everything shows from microscopic examination that the identification is correct. There are, of course, many other foods found in jars on the floors of cliff dwellers' rooms and we know their dietary was not alone corn products. We find bean, squash and pumpkin seeds and a great variety of animal bones in receptacles, showing that the cliff dwellers had a large variety of animal as well as vegetable foods. Most of their food was corn, a plant which America gave to the world, and which saved both the Jamestown and Plymouth colonies from starvation in colonial days.

A Suggestion

LIVE tips from thinkers out in the field have given the American Institute its greatest tasks to do. "While glancing through the morning mail," writes H. Carroll Meade, of the Meade Baking Co., of Baltimore, "I noticed that nearly all the mail was cancelled with a stamp advertising the National Council of Traveling Salesmen's convention. While the whole nation seems to be wanting to stimulate the consumption of wheat would it not be well for the bakers as an association, to ask the postoffice department to use a stamp advocating the use of more wheat for national prosperity?"

There is no question about the grand work you are doing for our industry.

—C. L. KEATER, The Barber Milling Co.

Books for the Baking Laboratory

BACTERIOLOGY AND MYCOLOGY OF FOODS. By Dr. F. W. Tanner. John Wiley & Sons, Inc., New York City, N. Y. 580 pp., 10 plates, 86 figs.

Dr. Tanner, who is assistant professor of bacteriology at the University of Illinois, brought to his task of writing a volume for food chemists, a marked gift for clarity in statement. The young baking chemist who wants to learn about the field to which yeast control is related, and the general background from which attacks on rope, mold, and "bleeding bread" are to be made, will find in this volume a book which will save him from the necessity of a great amount of diversified reading.

If the baking chemist is in a position to start a laboratory of his own, Dr. Tanner gives him abundant information on all forms of technique for the study of bacteriology. In his first chapter, for instance, Dr. Tanner deals with all standard forms of fermentation flasks and tubes. He describes, with illustrations, all types of Petri dishes used for bacteriological purposes, and describes the types of holders and containers which a laboratory should possess.

Inoculating needles and loops, counting devices, pipettes, diluting pipettes, and all other forms of apparatus are described so that the beginner may properly equip his laboratory and learn the use of each required instrument.

Methods in applying both the anaerobic method and the aerobic method are described.

After each chapter a series of "Don'ts" are given, most of which apply to the bakery as a whole as much as to the laboratory:

"Don't let dust and dirt settle on your microscope.

"Don't forget that the higher the power the shorter the working distance.

"Don't try to clean a lens with a dirty cloth."

After a full course in the use of the microscope, stated in a simple, clear manner suggestive of many years in such work as a teacher of aspiring youngsters, Dr. Tanner turns to the preparations of media and their control. He discusses the special advantages in particular cases of gelatin, potato starch, agar, bouillon, synthetic media, blood, milk, and blood serum media.

Through an intensive discussion of laboratory sanitation he clarifies the principles behind modern sanitation in general, which have to do with

the prevention of growth of bacterial spores afloat in the air or at rest in laboratory dust. Yeast he discusses after fully informing the reader in all methods of bacterial control, and study through stained media.

To yeast he gives a place in company with other agents of food alteration such as fungi and molds. Yeasts he classifies as fungi which cause many changes in bread besides merely "leavening" it. Besides the true yeasts, such as *saccharomyces cerevisiae*, and *saccharomyces ellipsoideus*, he describes the false, or "pseudo" yeasts, which differ from real yeasts in that they have no power to spore themselves up against a day of famine and unfavorable conditions in the food supply. Yet they "bud" as real yeasts do when they find sugar, moisture and warmth in their environment. Dr. Tanner gives us a key to the genera of true yeasts and a detailed description of yeast manufacture of great value to the student. He discusses yeast foods, compressed yeast, and various methods of studying yeasts in the laboratory.

In the matter of yeast as used in bread making Dr. Tanner hails the day of yeast's first segregation from dough and its preparation in outside media for use in bread making as one which "caused a distinct advance to be made in the production of leavened foods."

The volume discusses milk and milk products, and meat and meat products as completely as it discusses leavened bread and its ingredients, such as flour, water, milk, butter, and eggs.

H. E. TURLEY.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Action of Shortening in the Light of the Newer Theories of Surface Phenomena. Washington Platt and R. S. Fleming. *Ind. Eng. Chem.* 15, 390-4 (1923).—The physical effect of shortening on the structure and physical properties of the dough and finished sugar cookies was studied. In this type of product shortening acts by interposing itself in layers between the particles of dough, thereby preventing the formation of one continuous mass. This structure can be observed with the microscope in both the dough and baked product. Plasticity

of different fats at the temp. of mixing (about 80° F.) is an important factor in causing differences between their shortening power. The shortening power of plastic fats is detd. by the plasticity and unsatd. glyceride content and by the latter for fats not plastic in the dough. This is in accord with the present ideas regarding orientation of mols. and the energy relations at interfaces. The parallelism between shortening and lubrication is pointed out.

H. A. LEPPER.

Fat Coloration in Yeast as a Criterion of Age, Quality, and Degeneration. Bernfeld. *Woch. Brau* 39, 195 (1922).—The presence of fat in yeast cells may be rendered evident by staining with either alkanna or soudan III. An aq. suspension of the yeast similar in consistency to that leaving the separators is stirred with alc. soln. of soudan III, satd. in the cold, this being added drop by drop until an orange-red coloration is obtained; the action of the coloring matter is continued for 30-80 minutes. The extent to which the color is taken up increases with the no. of generations; thus, if the time during which the dye acts is const., cells of the first generation may show no color, while those of the third generation exhibit small, slightly tinted points and those of the fourth larger and distinctly colored fat drops. Small cells are usually richer in fat than older ones. The results obtained may be vitiated if the staining is prolonged, owing to the toxic action of the alc. or dye coming into play. If 0.005% of methylene blue is mixed with the soudan III, dead cells may be detected at the same time.

J. S. C. I.

Report on the Food Requirements of Man and Their Variations According to Age, Sex, Size and Occupation. Food (War) Committee, Royal Society, 19 pp. (1922).—On account of refuse and waste, food as purchased should have a utilizable caloric value approximately 10 per cent higher than the calories actually required by the individual. The basal metabolism of an average man (body weight 66 Kg., height 171 cm., age 25 to 50 years) is 70.3 large calories per hour; approximately 300 calories are required daily for purposes of locomotion. The total energy requirement of a man in 24 hours is the sum of: (1) basal metabolism during 8 hours sleep (2) basal metabolism increased by 30 per cent during 8 hours free time, and (3) basal metabolism plus the work increment (mechanical work performed, measured in calories, multiplied by a factor varying between

3 and 8, usually 5) for 8 hours. The total caloric requirement of an average American man (body weight 145 lbs., height 5 feet 8.5 inches) is slightly above 3000 calories daily. The energy requirement of a man varies, with the work performed, between 2500 and 5000 calories, the food requirement between 2750 and 5500 calories. During exposure to a low temperature, extra calories should be supplied, as protein (meat and fish) to a sedentary individual, as fat to a man engaged in bodily work. The average working woman has an energy requirement of 2400 calories or a food requirement of 2650 calories; women engaged in sedentary occupations (such as typewriting) and free from the heavier duties of the home have an energy requirement not exceeding 1900 calories, amply satisfied by a food allowance of 2100 calories. Children over 13 years of age have the same food requirements as an adult of the same sex; those under 6 years 50 per cent, those between 6 and 10 years 60 per cent, those between 10 and 13 years 83 per cent of that of an average man. A growing child, who works with the same energy as an adult working man, requires additional food, say 200 calories daily. The brain worker requires 2200 to 2600 calories, light and digestible, and containing a relatively high proportion of protein. A condition of semistarvation, with the food intake reduced to 2/3 its normal value, reduces the basal metabolism, and is apparently without danger to health even if extended over a period of several months; if extended over a period of several years, the resistance to tuberculosis is greatly reduced. A diet must contain sufficient calories as well as minimum amounts of proteins, fats, carbohydrates, salts, and vitamins. The protein content of the diet of an average man should not be less than 70 to 80 g. daily; it should be derived from a mixed diet, and if possible, include a certain amount of protein of animal origin; the diet of infants and young children should contain milk as a source of protein. The minimum desirable amount of fat eaten daily varies with the race; a Japanese soldier requires 20 g., an Italian laborer less than 60 g., people of British descent, 75 g., as much as 35 or 40 per cent of the total energy may be supplied as fat; in vigorous muscular effort at least 25 per cent of the food energy should be represented by fat. To supply vitamins, a certain proportion of fresh fruits or green vegetables should be included in the diet.

JOSEPH S. HEPBURN.

Service—and a Conquest

WHEN an automobile breaks down on the road in this year of 1923 many a motorist who carries on his radiator the insignia of his motor club, can telephone for a trouble man, who comes speeding out on a little white motorcycle. The "trouble shooter" touches the distributor head, the carburetor, or the generator with a tiny screw-driver; the motor hums again, and the party is off upon its way with the loss of only a half hour or so.

But it was not always thus. Until the motorists organized and put into the field their "trouble shooters," some trivial trouble in rotor head or carburetor was a dependable cause of tour ruination. If the motorist shoved the car to the nearest garage, he was likely to wait days for its repair, and be charged a prodigious total for "hours spent in seeking the source of trouble."

A baker two months ago sent loaves of bread to the American Institute to be scored. One day the wrappers were taken from a loaf. It was moldy. Next day it developed rope. What could be the cause?

Many a baker, who once was powerful, could not find out the cause of such trouble until he had been ruined by the sale of bread that the customer found smelly, stringy, and unedible. The baker could not tell in advance that the customer would find his bread that way, for it left the bakery looking perfect.

In this last case to come under the observation of the Institute staff, O. W. Hall, the institute's "trouble finder for sick loaves," made a single long distance guess. It was that the bakery whose bread could develop both mold and rope, had been invaded by some exceptional source of infection.

He risked a telegram on his guess. He wired the baker that both mold and rope

had developed, and this must mean some water on the floor somewhere, in which flour was lying at a warm temperature. Or else there was some moist, moldy flour or bread close to the mixing rooms. Mr. Hall advised a rigorous clean-up, to get rid of all mold spores lurking in the dust of the bakery, and their source in any substance containing sugar.

Next he advised a washing of the entire bakery with vinegar water, and a greater aging of the doughs. He explained that the bacillus causing rope could not thrive in dough containing enough acid. As acid increases in doughs the older they get, a fairly old dough was good insurance against rope. He advised adding a little vinegar to the dough as anti-rope insurance.

And the result? Along came more loaves. They were mold free. They were rope free. Mr. Hall even "incubated" them under conditions most favorable to mold and rope development. They proved themselves free from both infections. At a luncheon party for students Mr. Hall served the bread from this bakery, just to show what a transformation could come about when a baker knew how to use the service of the laboratories created by his own national organization.

Do all bakers know how to utilize their own available service? In one of the larger bakeries in the Middle West an Institute visitor saw a non-insulated water pipe running across the basement ceiling. It was dripping water upon flour sacks which had congealed upon it from the atmosphere. A strip of mold three inches wide ran across the top of the flour sacks, and when this same Institute visitor bought a loaf of this baker's bread in a grocery store, it proved to be moldy. The baker had not guessed how the spores of that moldy strip in the cellar had permeated every corner of his bakery, and had infected new-baked loaves.

BAKING TECHNOLOGY

*A Journal of
Applied Science
in Baking*



*Published by
The American Institute
of Baking*

Vol. II

CHICAGO, ILLINOIS, NOVEMBER 15, 1923

No. 11

Toast's Big December Drive

THREE weeks from the time these words reach the desks of American bakers, Chicago should be all ablaze with the Story of Toast and the way toast can be made the vehicle for carrying fine, standard American foods into homes where they are now, perhaps, much neglected.

In bakeshop delivery rooms wagons are now being redecorated and in place of old signs of which the eye has wearied, the new slogan of "toast for breakfast" and toast at every meal is soon to appear.

If it were only a matter of bakeries and bakery wagons, this story would not be

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worth writing. But it is a matter of milk wagons and meat wagons and electric light bills, and gas bills, and grocery store windows, and many other elements as well, including the radio and home demonstration classes.

There will commence on Monday morning, December 3, Chicago's first great demonstration of what the "bread and" group of merchandisers do to bring toast into

greater use in the home. This group of merchandisers has only been assembled recently, and into its membership has come an amazingly large number of people, each one conscious of his own interest in get-

ting more facilities into the home to make more and better toast.

The end of the new drive, of course, is not toast alone. Toast has merely become a vehicle for assembling an army that will probably never disband again. Once it has carried through a toast campaign it will find other campaigns to carry through. All of them have been marshaled under the slogan: "Glorify the product—forget the brand."

The personnel of this new army of men and interests closely affiliated with the baker's welfare, is one every baker in every town should study closely.

Personnel of Drive

Involved in the work they are undertaking jointly are representatives of the following business interests: Advertising companies, wholesale bakers, retail bakers, allied trades of the Baking Industry, cheese manufacturers, cream and butter manufacturers, electric current distributors, electrical manufacturers, flour millers, gas companies, grocers, hardware dealers, home economics teachers, hotels, meat dealers, milk producers, baking publications, milling publications, restaurants, sugar companies, raisin producers, yeast companies.

Array of Co-operators

These splendid co-operators started in at their tasks with a determination to make their co-operative spirit count in success for the Chicago Toast Week. They agreed that as Chicago went, so would go the rest of the country in large part. Therefore, they decided to work up the Chicago campaign so that it might serve as a model for other cities.

But "other cities" could not wait. Pittsburgh staged a "toast campaign" of its own as the Chicago plans were just rounding into shape. Columbus, Cleveland, Toledo and Detroit fell quickly into line. To

all of these cities went Dr. L. A. Rumsey of the American Institute of Baking. He explained how the toast campaign idea had grown and had gained acceptance by first one group and then another, until it had been agreed upon as an initial co-operative drive. He also explained how an electrical toaster, when introduced into the home, led almost always to the consumption of two or three more loaves of bread per week.

While Dr. Rumsey was visiting the large mid-western cities which wanted to stage toast campaigns of their own, Grosvenor Dawe of the Wheat Council of the United States was touring the northwestern cities, Milwaukee, Minneapolis, St. Paul, and going on out to Omaha, Kansas City and St. Louis.

In all of these cities the same groups which were so ready to co-operate in Chicago took hold of the situation and arranged for the campaign locally.

Method of Support

Often they obtained the following manifestations of support:

The hotel men featured toast orders on hotel menus, and carried the line: "Eat it with toast" as a flyer across the top of the menu card.

The yeast manufacturers helped with wagon banners and posters featuring toast.

The meat men displayed toast-sandwich posters in their places of business.

The packers distributed special literature dealing with bacon sandwiches and urging their more general use.

The electric company serving the city put its particular brand of toasters on sale in grocery, butcher and bake shops, and called attention to them on monthly statements to customers.

The electrical supplies dealers gave space to the toast campaign in all their trade publications. They explained it as a na-

tional cause in which they could help, and their method was to make Toast Week a toaster selling week in an intensive way.

The restaurant press co-operated by printing articles on how to make good toast in public eating places.

The gas company serving the city promised co-operation through printing the story of toast on an edition of 750,000 copies of the *Gas Gazette*. It goes to every gas user with the monthly statement.

Bakers bebannered the sides of their wagons with toast slogans.

Radio broadcasting stations freely offered them for use during Toast Week in making ten-minute talks.

Women's clubs, at the request of the Illinois Federation of Women's Clubs, received the campaign in a co-operative spirit, and spread the gospel of the way in which toast may be used as an economical breakfast food.

How to Start Campaign

For any city wishing to enter into a toast campaign there has now developed a plan that may be called a "model plan."

One of the first things to do is to send to the "Wheat Council of the United States" for its little folder: "TOAST—GOOD WAYS TO USE AN OLD FRIEND." The folder is a small, four-page leaflet, giving eight or ten ways to use toast at all times of the day.

It gives recipes for milk toast, French toast, cinnamon toast, toasted ham sandwiches, Welsh rarebit, toasted cheese sandwiches, and many other forms of toast.

These folders can be wrapped in with loaves of bread, or distributed over grocery store counters, or at mass meetings of women.

After the date to begin has been fixed, it is desirable, where possible, to obtain a proclamation from the Mayor proclaiming Toast Week as a publicly recognized func-

tion. A public meeting should be called at which at least one good speaker can give a definite view of the necessity for a toast campaign, and the good it can accomplish to the farmer and to many industries associated with toast and bread.

In the matter of public displays, banners should be carried on both sides of delivery wagons, and on top of delivery wagons in the large cities. Banners for use on wagons have been obtained for the Chicago campaign at a cost of 25 to 35 cents each.

In every city a close contact should be kept up with the Wheat Council offices in Chicago. Where the city planning the campaign can arrange the matter the general director should be sent to Chicago for a conference with the Wheat Council officials and those in charge of the Chicago campaign so that he can see at first hand just how a big campaign is organized and handled.

A "sweet goods" campaign may follow the toast campaign, in which the use of sweet goods for breakfast will be intensively studied and every means taken to make it as easy as possible to obtain the best and most appetizing sweet goods at the breakfast hour. Sweet goods, rolls, and coffee cake, as well as raisin and fig bread, can be mentioned as making splendid toast.

The "breakfast idea" can be over-emphasized. Many Canadian families serve five or six kinds of bread and toast, with bacon, for supper. Toasted sandwiches can be used at teas and for buffet dinners. Toast for every meal should receive a fair share of the emphasis, as well as toast for breakfast.

Organizing for Work

John Burns, "father of the toast idea," has had much experience in organizing the

first toast campaign, and especially the Chicago campaign. He suggests that the following plan be carried out where practicable.

In the first meeting it is well to elect a chairman who is not representative of any group at the meeting, but is a representative of the Wheat Council of the United States, or can report to the Wheat Council as local spokesman for its policies.

After selecting a general chairman the next item of procedure should be to organize each group present in the general "bread and—" assemblage. Thus the butcher men should make their own organization, the jam men their own, the milling men their own, and so on through all groups present.

The third step is to find from each group who are the important owners of interests in the industries they represent. Thus can be assembled a list of names of men who can commit their companies to expenditures, backing up the toast campaign idea.

The fourth step is to organize the local campaign with a chairman, backed by an executive committee of one man from each group. All present should be careful to see that the members of this key committee are enthusiastically in favor of the campaign. They should be men having standing and authority with their own companies.

A stenographer should be appointed at the opening of each meeting and should take full notes, this record to be distributed to all present and kept as a working record of the campaign's progress.

After the committee organization work is finished, a definite date should be selected for the campaign to begin. No date should be fixed for it to end. It should be started with a view of its being carried on as a continuous drive, with the application of new pressure behind the central idea whenever possible.

A Toasted Supper

DURING the world war Mrs. Carl Miner, wife of a well known chemist, made it her personal pleasure and privilege to entertain at her home near Chicago some sixty or seventy soldiers every week. The soldiers came down from Fort Sheridan.

As the home was not a very large one compared to the needs of such a gathering, the problem of what to give the soldiers to eat assumed considerable importance. It was all solved through the use of toast. And Mrs. Miner was so delighted with her toast dinners that she has made them a permanent summer function for her family and friends.

Her fire for toasting was an open-hearth wood fire. She bought a large wire grill, which would hold about a dozen sandwiches at a time. Between slices of bread she arranged slices of bacon, minced mutton, ham, minced turkey, minced chicken, minced corn beef, and pimento cheese. The bread, thus made into attractive sandwiches, was now toasted over the hearth fire. As a rich brown color appeared on the side of the sandwich nearest the fire, the grill was turned over, and the other side was also toasted to a rich brown color. It was found that black toast was an abomination, and was as bad as the browned toast was good.

Once the wire grill was opened the dozen sandwiches were eagerly taken in charge by the visiting soldiers. Another set would be back on the fire in a moment and as the toasting operation only required 6 minutes per each dozen of sandwiches, the entire body of soldiers were well served as the evening progressed. The juices of the meat and cheese were absorbed into the bread as the outside crusts were toasted. The cheese, in fact, bound the two slices of bread together until all might have been part of a single helping of food.

The Press on Toast

IT IS now boldly advanced that the way to save the wheat farmer is for the consumer to eat his wheat in the form of toasted bread.

Here, at last, is candor. Nay, more; here is a solid understanding of the nature of the economic problem involved. When there is a surplus of wheat, eat it up; when there is a surplus of shoes, wear 'em out; when there is a surplus of fireworks, shoot 'em off.

That's the way to get rid of a surplus and restore prices, and we're glad somebody is telling the truth about it at last. It's mighty refreshing after hearing all we've heard about the necessity of the government buying up surplus and storing them in the basement of the capitol at Washington.

That the toast advocates understand the problem better than the politicians is the encouraging thing.

—*Kansas City Times.*

There is no patent medicine that Congress can deliver to reduce the afflictions of the wheat farmer.

—SENATOR CAPPER in the *East St. Louis Journal.*

Tremendous improvement has accompanied the making of bread in modern bakeries. Those who are engaged in looking after the physical welfare of the child are strong advocates of using more milk and more bread, or more toast. Thus the bakers' loaf has made good and has earned its popularity.

—*The Galveston Tribune.*

During the world war the people were exhorted by Herbert Hoover to eat less wheat so that it might be saved to feed the allies. The people responded by eating substitutes. They have not returned to wheat in nearly the proportion that they turned away from it. They are over-Hoov-

erizing. With a bumper crop of 8,000,000 bushels in immediate prospect, the Pacific Northwest faces the problem of finding a market for it at a living price for the farmer. The national answer to this situation must be found—in national plans to eat this surplus up.

—Walla Walla, Wash., *Bulletin.*

It is easy to tell a wheat farmer to quit raising wheat, if wheat is too cheap. But it is easy also to tell a cotton farmer to quit raising cotton and go to raising sugar cane. But it is about as wise and practicable as it would have been, when the coal miners' dispute was on, to have told the miners: "Quit mining coal and go to chopping wood."

—JOSEPHUS DANIELS in the *Tulsa Tribune.*

More and more the people of America are eating more prepared breakfast foods and eating less wheat. Wheat is the delicacy, the aristocrat of breadstuffs. Our people could eat more to advantage. Their failure to do so is what has caused the present surplus, for we are exporting more flour than we were before the war.

—The Paxton, Ill., *Press.*

In Europe

I HAVE just come back to America from a trip through Europe, and I return enthusiastic over the fact that I am an American citizen.

Europe may have a great many beautiful spots, but it is difficult to believe that a country could remain so many centuries behind this country, and still be only five days away by fast boat. One per cent of the people have wonderful and extravagant homes and ninety-nine per cent live in hovels. Baking machinery is getting an immense hold in the industry, and it may soon dominate all shops now engaged in hand work."

—From a letter of a returning baker who has just toured through "the Old Country."

New Tests for a Loaf of Bread

How Physical Measurements Can Be Made to Supplement Bread Scoring to Advantage

By WASHINGTON PLATT

FOR YEARS bakers have been hearing that "the baking test is the only way to find out what is in a flour." Baking chemists have found that they seldom or never could make predictions with complete accuracy.

This means that we must turn from a study of the processes involved in many operations to a close measurement and study of the physical results obtained. I would like to see in the baking industry a much greater use of actual physical measurements than is now the case.

The need for this we can easily determine by studying results obtained in a few other industries.

In some fields knowledge is now so complete that we are enabled to predict the results which will follow from definite causes. For example, if a new electric motor or a new turbine is designed, experts can predict correctly the speed, horsepower, efficiency, etc., which such machinery will develop. The same thing is true of some branches of chemistry involving simple mixtures, dilute solutions, etc. In these we feel that we understand the principal factors involved and that we are, so to speak, masters of the situation.

In many other industries our knowledge is now, or was until recently, exceedingly incomplete. We may take as an example the iron and steel, cement, gelatine and our own baking industry. In all of these our knowledge of the real chemistry involved is extremely incomplete. We can seldom or never make predictions. The best that the scientists can do is to run along behind and attempt to explain in

scientific terms what the practical man has already discovered. In such circumstances definite physical tests and measurements on the finished product often enable us to leap at one bound the intervening processes, and to determine the effects of certain ingredients and certain processes on the finished product.

The iron and steel, cement, and gelatine industries among many others are all excellent examples of the value of physical tests on the finished product at a time when the chemistry of the industries was very confused. Take the one example of the iron industry. Rapid and definite progress was made in the past fifty years, not because of chemical discoveries as to the fundamental actions which took place, but because iron manufacturers knew the qualities which they wanted in their finished product, and they had reliable and definite means of measuring such qualities, such as hardness, tensile strength, elastic limit, etc.

Improvement was, therefore, assured and quite easy. Anyone, regardless of his knowledge of chemistry, could test the effect of different ingredients on the quality of the finished iron and could continue to use those ingredients and those methods which gave the qualities desired. The same is true of other industries. In the cement industry tests on strength in compression, strength in tension, time of setting, etc., have enabled us to make ever stronger and stronger cement. In gelatine, tests on jelly strength, viscosity, etc., have enabled us to control these qualities, even though we are still in the dark re-

garding the chemical reactions which take place. The same would be true in the baking industry if we should develop accurate physical tests.

We all remember hearing about the old days in the iron foundries. The old iron master judged the quality of his product by breaking a casting and examining the fracture, noting the color, fineness of grain, etc. From these he drew his conclusions regarding changes in his mixtures and methods. Those very practical men of those days learned to tell a surprising amount from such a simple examination.

Scoring of Bread

How old-fashioned and unscientific such methods seem to us now when in a few minutes we can get with the greatest accuracy the hardness, tensile strength, elastic limit, etc., of any piece of iron and can record all of these qualities in permanent form in such a way that the results can be checked up at any other place and at any other time.

Such methods were certainly old-fashioned, but are they not closely parallel to the methods now used in examination of baked products such as bread? The old ironmaster broke the castings and examined the fracture. We cut a loaf of bread and examine the cut surface, punching and crushing it a little. We then go ahead and score the loaf; a process which is indefinite, at best, and on which no two people have ever exactly agreed.

I do not mean to advocate the discontinuance of scoring bread, as this method is certainly much better than nothing at all, and has been the means of real progress in the past. What I would advocate very strenuously is some definite physical measurements on our finished product in addition to the present scoring.

Let us determine the tensile strength of the bread, cutting out a piece of standard size and shape similar to the standard

block of cement or to the standard strip used in the textile and paper industries.

Let us also determine the compressibility of a standard cube of bread under a light load and the elasticity or degree to which such a cube would recover its normal shape when the load is removed. Just as the surface of a jelly is tested with a plunger, so the recently cut surface of a piece of bread could be tested with a properly shaped plunger and valuable and reproducible data obtained.

Accurate machines for making all of these physical tests on many other materials are now on the market. Simple changes would enable them to be used for bread. Such measurements would help us to obtain absolutely definite results which could be recorded and compared with similar measurements made at different laboratories or at different seasons. These measurements would give us a series of values which could be expressed in the form of graphs (a form of expression dear to the heart of every modern chemist). Such methods would probably enable us to determine those qualities which we desire in bread and then to secure them in the best possible way, even before the theoretical chemistry of bread baking is fully understood. Similar tests could be made on sponge and pound cake.

Some Added Factors

When flour is not to be used in actual bread making I would most strenuously urge that we avoid as far as possible making a test by baking a yeast-raised loaf. By using yeast we introduce another important variable. We also have a test which is both slow and difficult to make accurately and which is almost impossible to duplicate in another laboratory. I can hardly think of a test where more depends on individual manipulation or which is harder to standardize than the bread baking test as now carried on.

For flours which are not to be fermented I can highly recommend the test used by myself (1) and by Davis (2) which consists in making up a standard biscuit and baking it under standard conditions. Though this test involves some care in the manipulation, it is much quicker and much easier to standardize than a bread baking test. The finished biscuit can be tested for breaking strength, crushing strength, spread, spring in the oven, color, elasticity, and as many other tests as you will. By varying one ingredient, the measurements may be used to test any of the ingredients used in biscuit baking. For example, by varying the shortening, the shortening power of different fats may be tested. By varying the flour, the effect of different flours may be accurately determined, similarly, for the other ingredients.

Rather remarkable accuracy is possible in carrying out these tests.

To sum up, many other industries in a condition similar to ours have found definite physical measurements on the finished products powerful aids in the making of rapid progress. This would probably be equally true in the baking industry. The value of this method has already been proved by tests of this kind made on unfermented biscuits.

Who will be the pioneer in extending these tests to other forms of baked goods?

1. Ind. Eng. Chem. 15 (1923) 390, Chem. Age, 30 (1922) 157, 203.

2. Ind. Eng. Chem. 13 (1921) 797.

Into Trouble and Out

IN THE old, old days when bakers' apprentices learned their dough sheets in the fear of the Lord and the bakery foreman, this story couldn't have happened. It is about a dough that was "thrown down" from the fermentation room to the divider, three floors below, before it had more than half fermented.

It was thrown down by a mere bakery beginner who hadn't learned yet how to "talk bakers' talk." The foreman had told him to "knock down the dough," and he had proceeded to "throw it down." If he had knocked it down as directed he would have "given it its first punch," as all good bakers know.

As it happened, this error due to interpretation of bakers' language happened in the School of Baking of the American Institute. In the dough batch which went shooting downward three floors, with 70 minutes of fermenting still due it in the fermentation room, was 75 pounds of French dough.

What was then to be done? Before the shop foreman found that his orders to punch the dough had been misinterpreted, eager students on the divider floor, who were having their first day at shop practice had divided by hand more than half the dough. Was it best to throw the whole batch away? Or to try to carry what was left up three flights of stairs?

William Walmsley, in charge of the class, decided that here was a chance to teach a lesson not in the curriculum, but nevertheless useful to all who might be faced with sudden shop emergencies. He ordered the dividing of the dough to be continued to the end. Then when all had been rounded and installed in the proof box, he allowed the separate loaf-size pieces to mature until the time for the second punch arrived. Then he had the students round them a second time. It had the same effect that a second punch of the dough in the fermentation room would have had. The same practice was resorted to when the time for the third punch arrived.

Result? In the baking the loaves turned out "as fine as any French bread ever baked in the Institute."

As to Health Inspectors

THE article on "Bakers and Food Officials" in BAKING TECHNOLOGY is a sane one—ought to do much good. We have hard work in getting away from the idea that the food inspector is a sort of second-hand policeman. As a matter of fact, a good inspector is a competent adviser and should have at heart the promotion of the industry that he is inspecting, as well as the protection of the public's health. In one of my addresses I said: "A milk inspector is not only a guardian of the public's health, but a builder of the industry as well. I should like to see this idea taken to heart by all food producers and manufacturers."

—HORATIO NEWTON PARKER, City Bacteriologist and Chemist of Jacksonville, Florida.

Research in Rice

THE SCIENCE of rice milling has undoubtedly made rapid strides since the days of the mortar and pestle. The present processes are admittedly ingenious, but in many respects they lack the proper control. Very little is known at present about factors such as the moisture content of the rice being milled, its temperature at the various stages of milling, and the effect of the humidity of the surrounding air.

To ascertain the effects of these factors, rice milling research is essential to the industry's growth. No industry has ever abandoned research once it has gone in for it, for its benefits have been quickly seen. Most large corporations increase their appropriations annually to meet the growing demands of research. Every year finds chemical engineers invading a new field with favorable results, one of the last being the bread baking industry, where in a short time it has revolutionized processes.

—TRUMAN B. WAYNE, in *The Rice Journal*.

A Wheat Competitor?

HAS wheat flour a new competitor in herring flour? Up in the Iceland country they have caught so many herring that they have taken to grinding them up for flour to take care of the surplus. The herring flour is said by Counsel General Letcher at Copenhagen to be "highly prized in Norway as a strength food." It is reported by the *Journal of Industrial and Engineering Chemistry* that the herring flour contains 70 per cent of fat and protein.

The oil can be extracted by pressing and then can be hardened until it is a tasteless, odorless mass, suitable for making margarine. It is planned to build up a "strength food" reputation for the herring flour and make a great deal more of it each year, in connection with the salt herring and herring oil trade. It is said there is no limit to the number of herring that can be caught off Iceland's shores each summer.

You Never Can Tell

FOR the U. S. Department of Agriculture, G. L. Keenan prepared a bulletin giving the microscopical count of hairs in various types of flour. He suggested that a classification of flours could be based on the hair count alone.

This idea touched the risibilities of J. C. Enright, fearless defender of "all o' the wheat" flour.

"Just to show you that I read your magazine," he wrote concerning a number in which the Agricultural department bulletin was quoted, "I would suggest that you write an editorial on the advantages of grading flour by the hair on it. In this connection it would be well to point out the advantage of choosing flour that has blonde hair, over brunette, and to warn the baker that flour wearing whiskers, either blonde or brunette, is to be rejected as not up to sample."

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

Published by the
AMERICAN INSTITUTE OF BAKING
1135 Fullerton Ave., Chicago

Entered in the post-office at Chicago, Illinois, as second-class matter, under the act of August 24, 1912.

Price, Fifty Cents a Number; Five Dollars a Year.

NOVEMBER 15, 1923

We Work Together

***To win through quality production
and the utilization of scientific research
a welcome for two loaves of wheaten
bread for every one that now finds favor.***

If Nobody Cared

A SLOGAN that meets the eyes of many who glance at billboards as they pass, carries these words: "SUPPOSE NOBODY CARED." They appear below a drawing of a crippled child with crutches, and represent an effort on the part of welfare workers to raise funds for their work.

Is the question not applicable To our INDUSTRY?

As this issue reaches your desk twenty-seven men who DO CARE will be meeting in Chicago as your representatives. The Board of Governors then will be giving unselfish, serious thought and time to the future of your business and theirs. You CARE sufficiently to pay the dues requisite to membership, but are you doing anything more? Can you go after one new member for American Bakers Association with the same vim that you put into your own business activities?

Crank up your flivver now and go after them: where would our industry land, supposing NOBODY CARED?

—RAYMOND K. STRITZINGER.

Speed in the Air

WHAT has he to lose who persists in standing still in this cyclonic world?

Could you imagine, to-day, that you might be eating in San Diego to-night, bread baked in New York this morning? Could you imagine a crew of Zeppelin flyers coming over from Switzerland and landing in New York with fresh bread still in their hamper?

Both of these imaginings may seem crazy, but they are not a tenth part as crazy as they would have appeared five years ago. Aeroplane flyers making nearer 300 miles an hour than 200, suggest the possibilities of even this infant age of flying. Suppose a baker should create a loaf of bread that was demanded above other loaves, and distributed it by aeroplane fleets. A radius of 1,000 miles from his bakery would become his intimate dooryard, and his bigger "aerial trucks" would do the 2,000 and 3,000-mile circuits as easily as a motor car now does 100 miles.

Such an advancing force calls for watchfulness, and alertness to change. Right now, for instance, fleets off the Pacific coast ask bakers to bid for their bread supply. If the delivery were to be by aeroplane bakeries far back from the coast might be competitors without losing anything in the freshness of the goods to be delivered.

And Is This Silly?

WHAT is being done in the air is being duplicated on land, too, in a measure. Hard roads allowed motorists attending a recent Illinois football game to go further, in a drenching rain in an hour than they could go last year, on dirt roads, in seven hours. It means new invasions, and new defenses for home trade in the form of QUALITY production.

So short a time ago that it seems almost

yesterday, the writer stood on the deck of a British warship while one of the world's gentlest and finest young spirits soared "aloft" above that warship. The man in the air was Wilbur Wright. He had built a motor that would carry him just two miles per hour faster than the speed at which he would have crashed to his death. In altitude he could not get above the battleship's stream of smoke belching from its three stacks. A British admiral saw the spectacle of this first flight above water, and after the manner of many practical men he saw it without the slightest touch of vision.

"Why, I could shoot him dead with my revolver," the Admiral remarked, "that thing amounts to nothing."

Yet within ten years "that thing" had revolutionized warfare; had made battleships obsolete by bombing them to death from places in the high heavens, hid from the earth by clouds, and had come to the commercial world offering it a new era and vast new ranges of "territory." Who shall say the baking world will not one day adjust itself to its speed?

to market "to get there first," and were plowing up their orange groves because "5,000 carloads saturated the market," Powell gave them a lesson in honest merchandising.

"Not one bad orange for market," he declared. "Every orange must sell its successor." When he had pushed sales up to 28,000 carloads, and still cried for more acres of orange trees, many feared he would overplant the market, again.

"You raise the oranges," he shot back, "that's your business; I will sell them, every one; that's my business." And he did it, up to ten times what had ever been sold before.

No single man can sell America's bread crop and see that only quality loaves ever reach a consumer. But the Wheat Council can assemble mighty forces which have the same effect, and it can say to the wheat farmers: "You raise the wheat, that's your business; we will see that bread sells up to the full of its potentialities, and always calls for more and more wheat from the farm, as better bread products, made more available, carry it into more and more varieties of usage."

Concerted Salesmanship

SOME DAY, when things that the bakers are now doing in co-operation with the electric dealers, the gas companies, the home economics teachers, the radio stations, the millers, the Wheat Council, the butter men, the cheese men, the macaroni men, the milk men, the meat men, and the advertising men, are all added up, it will be seen that they brought in a new day for baking.

It is very simliar to the new day that G. Harold Powell brought to the fruit growing world. When California orange growers were rushing chemically ripened oranges

Steinmetz, Our Benefactor

WHEN Steinmetz made lightning he captured the imagination of the world. Who paused to think as Steinmetz passed from our midst that he was one of the great builders of the future baking industry? Yet that is what his work in synchronizing motors means for us. It means that dividers, rounders, proofers, moulders, traveling ovens, wrapping machines, can all be set to work at exactly the same speed and the dough can be carried through every operation from mixer to wrapper at an exact rate—as an army of men marches—no confusion and no tie-ups, due to disorganized, mob disorders.

Corn, Wheat and Bread

WHO can remember away back when bread sold for more than 20 large loaves for a dollar—and it took a wagon load of corn to pay for a dollar's worth of bread?

P. F. Petersen of Omaha can do this. And he also remembers the days when farmers would drive to town with wagons full of corn. After vainly trying to find buyers all day at 10 cents a bushel, they would open the endgates to their wagons and let the corn rattle out upon the ground, as they whipped up their horses for the trip back home.

A return to the 5-cent loaf, with other conditions to equal it, would only mean, as Mr. Petersen recalls those old pioneer days, "that people who possessed the 5 cents with which to buy the loaf would be vastly more unusual than they are today."

"Wheat at 40 cents a bushel and corn at 10 cents a bushel," writes Mr. Petersen, "only measure the price for being a pioneer in new country."

Mr. Petersen ought to know. He was chased out of Nebraska once by Indians when he was trying to make low-cost bread as a pioneer in the community in which he is now such a useful citizen.

British Exhibition Bread

I AM weary of the exhibition bread controversy. I note that my friends have been "falling foul" of each other over this controversy. Given a standard there is no question whatever about the ability of the judges to properly and justly allocate the prizes, but the misgivings come before the time of judging, and they are in fact concerned with the standards.

It is safe to say that when the exhibition was first started there was no "exhibition bread." Its appearance on the scene was hailed with contempt and the hardest

of hard words, but nothing material, because there seemed to be no possibility of killing the obnoxious infant with anything but words, and these were ineffective. At the beginning the stuff we now call by the dignified and honorable name of exhibition bread, we then called it fake bread, picture bread, books, bricks, anything but bread.

The new tone and attitude towards this kind of bread has a cause, or it may be several causes, and that, or one of the chief, is the selection of past prize-winners to be present judges. It may be that all the judges are not ex-prize-winners, but it is likely that those that are not may have accepted mentally the standards already set, and consider, quite rightly in such circumstances, that they have fulfilled their function and done their duty, when they have given the prize to what they think is the best exhibition of bread, with no regard whatever as to whether it would be the best bread whatever in the opinion of a connoisseur in the matter of bread, for amongst the public, particularly men, there are some very discriminating judges of bread."

—MACDUFF—in the *National Association Review*, London.

In America bread-scoring contests are becoming more and more of a convention feature, and it is interesting to note that in this country the entries are commercial loaves, from the general output of the competing baker.

Institute Impressions

BECAUSE the work of the American Institute of Baking, in chemical research involving bread problems, has attracted the notice of the American Chemical Society, Dr. C. A. Browne paid the Institute a visit during the last week of October.

Dr. Browne has recently been appointed

chief of the Bureau of Chemistry, at Washington. He succeeds to the place made famous by Dr. Harvey W. Wiley, when he was chief of this bureau. In addition to his interest in chemical problems Dr. Browne is a historian of the American Chemical Society and is keenly interested in any advance which indicates greater service for industry on the part of Science.

"This is the first institution of the kind I have ever been through," he said after inspecting the various departments of the Institute, "and I must say it seems complete to the last detail. I don't see where it could be improved upon either as a School of Baking or a center for research work. It is one of the most interesting institutes I have ever visited. It seems to me it covers the whole field extremely well.

"I am glad to find that in your bulletins and magazine you present scientific data in a popular and readable manner. In the American Chemical Society Dr. Slosson is performing prodigies of popular presentation, also. I have always felt a sympathy with the statement of Louis Agassiz that every scientist should be able to meet the test of three methods of presentation of his work. He should be able to present it to his colleagues in the language of science; to the lay public in the language of popular understanding, and to the coming generation in the language of young people.

"It has been a treat for me to find here some Pasteur flasks filled with pure-yeast cultures, and to learn that Dr. Max Henius, who brought pure-yeast cultures to America from the Hansen laboratories at Carlsberg, still has office space in the building as an 'Institute of Fermentology.' Among my most treasured possessions is a copy of the original edition of Pasteur's 'Studies in Fermentation.' No one dreamed when it appeared that it would lay the foundation of new and scientific principles of

medicine. Yet at the 100th anniversary of the birth of Pasteur, an exhibit was made up in New York of relics of this great master. Original Pasteur flasks and letters from him were treated as highly prized possessions."

Dr. Browne displayed great interest in work of scoring bread as it was carried on by O. W. Hall during his visit. He inquired closely as to every item on the score card and wanted to know just why every point was awarded. When the work of scoring had been concluded he suggested that the Score Card seemed splendidly adapted for general and universal service as a standard for judging bread.

Why an Association?

EVERY man has some good in him and most men have qualities that are noble and fine. Business should develop rather than crush these finer qualities, and the trade association is one important means to this end—to help men not only to gain material success, but also to find in their business life a free play for their hearts and souls, and so to gain the greater reward of spiritual happiness. No man can live unto himself alone. Trade associations, of which there are 1,000 in America, are the result of an economic evolution whose beginnings date far back into the past.

Their activities, as a part of American business life, have only just begun. The next decade will doubtless see a growth of these organizations which will mark a definite phase in our national development. The thought back of trade associations is sound, but no trade association has the right to exist unless ruled by the desire to best serve the public.

—GEORGE V. HORGAN, Secretary of the National Paint, Oil, and Varnish Association, in *Chemical Age*.

Concealed Bakery Losses

A Few That the Scales Would Reveal If Closely Watched by Bakery Foremen

By WALTER S. SMITH

WHEN a salesman finds it his common practice to call on men of many different industries, he naturally "sizes up" the representatives of each and carries them in his mind in a sort of rotation as to general "standing and intelligence."

Some time ago several men who mingle much with milk producers and bakers insisted the milkmen were about eight years ahead of the bakers in understanding the genius of organization, and the profits of united action through one National headquarters. Now the same observers admit that the bakers have traveled over the organization trail in a single year until they are coming up closely to the "front of the procession."

Thirty-five representatives of a manufacturer who visit both meat producers and bread producers insist that they found meat producers much more sensitive to a situation involving possible losses through erroneous weights, than are bakers. This manufacturer was asked to write out his story as a message to bakers. It appears herewith.

The actual objective of any business is profit. Business of any kind is successful when it can continuously force invested dollars to return plus a profit of more dollars.

All business must figure net profit as the difference between costs and the cash obtained from sales.

Labor charges, material, overhead and sales costs are positive. Production costs in the bakery business are always figured

on a basis of gross weight, all bakers' raw materials are bought on this basis.

All bakery products are produced by weight and sold by count.

Any business manufacturing products which are sold in thousands of unit weights takes wide chances of heavy "concealed losses" caused by inaccuracy in weight of individual units.

Few bakers realize that an overweight of one-half ounce on one pound loaves of bread will make them short in the count of salable bread, three loaves for every hundred loaves produced. If the actual cost of one hundred loaves is five dollars, the baker who gives one-half ounce overweight per loaf could not realize six dollars for this bread at six cents per loaf. He would only have ninety-seven loaves of bread to sell which could only bring five dollars and eighty-two cents. If this baker was producing three thousand loaves of bread a day, he would be short one hundred fifty loaves costing seven dollars and fifty cents. The loss as shown would be entirely "concealed" and could only be revealed by check weighing the bread.

Money as currency can be counted even in the smallest of units innumerable times with the same result, but any bulk weight material which is subdivided into numerous unit weights cannot be counted back unless accurately scaled.

A recent examination of weight conditions of five hundred loaves of bread showed an average overage of better than one ounce to the loaf. An interview with the baker produced a statement that, "We are bringing out our yield, consequently,

we are satisfied." The natural question here is, did this baker figure his yield to the maximum or the minimum? It is more than possible that his yield figures are concealing unnecessary losses. Bread weights are the most important thing a baker has to contend with. The return of the original dollars plus the profit will be directly proportionate to the number of loaves of bread produced, loaves of bread cannot be sold if lost by overweight.

There is another type of baker who states that underweight bread automatically balances overweight bread. This theory might have some value if the public at large did not have a good eye for size and heft.

If an overweight loaf is purchased by a customer today and a small one tomorrow, it is hard to establish the fact that the smaller loaf is really what the customer is entitled to, consequently, this system is not a good business builder.

If a baker wishes to promote good will, he should standardize the weight of his loaves, so that he can continually give the public exactly what it is entitled to and no more, nor less.

Business at its best is a hard, wearisome, nerve-racking "pastime" and profits earned should not be dissipated by costly "concealed losses."

Check weigh your bread not once a month but make it part of someone's daily duty to check weigh at least one hundred loaves.

At Last a Census

FOR many years bakers have wished there might be an intelligent census of the baking industry, in the general census report of the United States. They have looked over such reports in a spirit of disappointment that their industry never has been intelligently included.

Now all that is to end. The organized bakers of America, through their National headquarters, took the matter up with Dr. W. M. Stewart, Director of the Census. It was agreed that in the "census of manufactures for 1923," now being compiled, the baking industry should be fully represented.

To gather the needed data it was necessary to prepare a schedule for general distribution. It will reach bakers in January. The data asked for will be tabulated as soon as the schedules are received back in Washington. This means American bakers must "be on their toes" to answer in a responsive spirit as soon as they receive the blanks they are expected to fill out. Notices from the National headquarters will go to all bakers as soon as the schedules have been mailed from Washington to them. Thus the co-operative effort in taking the census will be forwarded, to the advantage of all. This census, for the first time, will differentiate bread products from crackers, sweet goods and other special forms, and each department of baking will be represented in its own special way.

As to Our School

A FORMER student of the American Institute's School of Baking, our present superintendent, Olaf Petersen, is still with us and is going strong. We have equipped for him a very complete laboratory in which he enjoys to work.

I am frank to say that sending him to your Institute for a school term has turned out to be a really fine investment. From what we have learned a school graduate can do for us we would have a hard time getting along without a graduate of the American Institute of Baking, or some other school of equal standing.

—FROM a letter from P. F. PETERSEN, of the Petersen-Pegau Baking Co., Omaha.

Edible Gelatine in Baking

It Is Subject of Research to Determine Its Effect on Nutritive Value of Wheat Proteins

By L. M. TOLMAN

Vice-President United Chemical and Organic Products Co.

THERE are a number of ways that the subject of Edible Gelatine might be discussed. As a matter of fact, there has been a great deal of attention given to the subject of Gelatine in the past few years, which attention has been directed from widely different points of view. The chemists have been directing their attention to the improvement of photographic Gelatine; students of nutrition have been directing their attention to the place of Gelatine in the diet, both for children and for invalids; bacteriologists have been directing their attention primarily toward the improvement in the methods of manufacture; while the pure chemist has been studying it as a colloid. There have been great developments in practically every line of investigation, so that one can see that the last 10 years has shown a very great increase in knowledge as regards Gelatine. But from the standpoint of this Association, it seems to me that the most important phase for discussion is the developments that have taken place along the lines of sanitary methods of manufacture, and the developments which have been made in showing the actual place of Gelatine in the human diet.

Early in the history of the Food and Drugs Act, attention was given by the Bureau of Chemistry to the subject of Edible Gelatine, because it was found that Gelatine products were liable to contain certain metallic impurities, and were likely to be high in bacteria of various kinds. So the

Bureau decided to make a thorough study of the raw material used and the method of manufacture of Edible Gelatine with the idea of finding the cause of these different troubles, and, if possible, proposing a remedy. This investigation by the Bureau was carried out under my personal direction, and for two years or more, with the co-operation of most of the large manufacturers of Gelatine in the United States, a study was made of plant conditions, of raw material, and of the effect of different methods of manufacture upon the finished product, with the result that the causes of metallic contamination were very thoroughly determined and remedies proposed. I believe that at the present time the manufacturer of Gelatine in this country has solved the question of metallic contamination. This, however, is not true regarding imported Gelatine, and we find that importations of various Gelatine for edible purposes are very limited on account of their not being able to meet standards of purity as regards metallic contamination.

In our investigation it was found that the source of zinc was the use of galvanized nets and other utensils; that the presence of copper was due almost entirely to the use of copper evaporating tubes and copper cooking coils, and that the source of Arsenic was primarily in the raw material, especially was it likely to be present in hide trimmings. All of these difficulties, however, were comparatively easily remedied, and at the present time the manufacture of Edible Gelatine is able to meet the very rigid standards that the De-

* Read at convention of National Dairy and Food Commissioners at Duluth, Minn.

partment of Agriculture established at that time for these metallic impurities. The control of bacterial spoilage, however, was a question of much greater difficulty of solution, as can readily be seen when we consider the fact that Gelatine itself is one of the best culture medias for bacterial growth, and that in the course of its manufacture the Gelatine itself is subjected to very favorable conditions for bacteria decomposition, both as to favorable temperature and moisture, and investigations for the solution of this problem have been going on steadily ever since. Some of the more important difficulties have been solved, but there are still some that remain for solution. In my opinion these investigations of the Gelatine industry marked the beginning of scientific progress in the Gelatine industry in this country.

Manufacturing Developments

Prior to that time, it was an industry carried on by the rule of the thumb, but these investigations required bringing into the industry scientifically trained men, with the result that tremendous progress has been made in the industry in the past 10 years.

It is my idea at this time to give you a brief review of the developments that have taken place in the manufacture of Edible Gelatine, directed primarily to solving the questions of sanitary manufacture. In order to do this, it will be necessary to give you a brief summary of the processes which were in use at the time this investigation was begun.

The raw material for most Gelatine is either Ossein, that is, bone which has been freed of phosphate lime by treating with acid, or skin tissue of some kind. Ordinarily, either of these products is treated in practically the same manner by first putting them into large vats with lime water, leaving them in this lime solution for from a few days to a few months,

changing this lime water as it is necessary until the material has softened and swelled to a condition suitable for cooking. This softened and swelled material is then thoroughly washed with water and finally treated with diluted acid to remove the last trace of lime, when it is ready to be cooked, which cooking takes place at as low a temperature as is possible. This thin solution of Gelatine which is drawn off is first filtered and evaporated sufficiently to that when it is cooled down in forms or pans, it will form a firm jelly. After the jelly has become firm, the block of jelly is cut up into thin sheets, spread out on metal trays or screens and dried in a current of warm, dry air. All during this process, and until the product is finally dried, it has been subject to a great amount of handling by hand and to many opportunities of contamination by dust or bacteria from the enormous amount of air which was blown over these thin Gelatine sheets during the process of drying.

The first important improvement in these processes as they then existed was the development of air-filtering and air-washing systems, so as to remove as much as possible all traces of dust and impurities in the air before it is used for drying the Gelatine. There have been some very successful air-filtering systems installed, and at the present time practically every Gelatine plant has such an air-filtering system.

The next step was to eliminate the great amount of handling of the Gelatine by hand in the cutting and spreading, and to overcome this difficulty, the chilled rubber belt was developed. This system consists of running the Gelatine liquor on to a moving rubber belt, which passes thru a chilled chamber, and the Gelatine liquor sets on this belt in the form of jelly, and this thin layer of jelly is automatically removed from the belt at the other end of the cooling chamber and spread on nets without

being handled at all. This was one of the most important steps in the Gelatine industry, because it practically did away entirely with the handling by hand of the Gelatine jelly from the time it came from the filters until it was finally dry.

Some other method of drying Gelatine than by means of blowing air over the sheets was the next important step from a sanitary standpoint to be changed. A few years ago nearly all Gelatine was dried by this method, and if the condition of the air filters were perfect and drying was rapid, a satisfactory product was produced; but it was recognized by all manufacturers that if some way could be devised to immediately dry the Gelatine as it came from the filters, it would solve a great many sanitary difficulties in the manufacture of Gelatine.

Our company has been experimenting on this matter for a great many years, and we tried drying Gelatine in practically the same manner as is used in making powdered milk; that is, by spraying the Gelatine solution into a heated chamber against a current of hot air. This produced a very fine product, and I have brought along some samples of spray-dried Gelatine for your examination. However, there were certain commercial difficulties in the way of this process, so that so far I do not believe it has been used on a large scale.

Steps have been tried to dry Gelatine on a vacuum drum dryer, and other similar methods that have been used on other products, but without any success commercially, until the development of what is known as the Schweizer Drying Wheel. This is a large heated wheel, on one side of which the Gelatine liquor is fed continuously, and cut off on the other side in thin sheets. I have some samples of these thin sheets just as they come from the wheel. The Gelatine is not marketed in these sheets, but is ground up into various sizes

as demanded by the trade, and I have various samples here, showing the appearance of the different sizes of this particular product and its comparison with the Gelatine dried in the old way. By means of this drying wheel, the Gelatine liquor in a very few minutes from the time it is drawn off the cook tank is dried and in barrels, so that there is no opportunity for development of bacteria, nor does it come in contact with a large amount of air laden more or less with dust and bacteria. When we consider that in the ordinary method of drying Gelatine, it takes from 24 to 48 hours, we can realize what a tremendous advance in the sanitary handling of Gelatine liquors this wheel drying of Gelatine is.

As a result of this method of drying, it has become possible to make practically a sterile Gelatine, containing not more than 200 to 300 bacteria per gram, and it has become commercially possible to sell Gelatine under a guarantee that it does not contain in excess of 10,000 per gram. The commercial value of this has become very apparent to the manufacturer of Marshmallow, Marshmallow Topping, Ice Cream, and other similar products, who have found that by using a Gelatine very low in bacterial content, the keeping qualities of their finished products have been tremendously improved.

In addition to these improvements in the methods of manufacture, there have been great improvements in the general sanitary methods of taking care of the plant and taking care of the machinery, so that the Gelatine now being marketed in this country is, I feel sure, very greatly improved over that which was manufactured a few years ago. The importance of the sanitary manufacturing of Gelatine is very apparent, when we take into consideration the recent developments in the

value of Gelatine as a food, and especially its place in infant feeding.

The food value of Edible Gelatine has been the subject of many investigations and has at times been very unjustly criticized. In recent years, however, its place in the diet has been thoroly established. In the light of present knowledge of nutrition the chief value of Edible Gelatine as a food is in its ability to aid in the digestion of other foods and to furnish its quota of Amino Acid to make other proteins of greater nutritive value. Gelatine is a substance which stimulates the flow of the gastric juice; in other words, it has a stimulating value. As a source of protein itself, it cannot meet all of the body requirements, but in many combinations with other proteins, it makes a very superior food.

Food Value of Gelatine

Prof. E. V. McCullom, in the "Journal of Biological Chemistry," Vol. 28, Page 483, showed as a result of his experiments with the use of Gelatine in connection with wheat and oats that the Gelatine greatly increased the nutritive value of the proteins of both of these ingredients. Experiments made by Dr. Downey of the Mellon Institute have shown that the addition of Gelatin to rye and barley bread brought about a satisfactory food, that is, the Gelatine supplemented the vegetable protein and made them satisfactory for growth and development. Gelatine contains a relatively high percentage of Amino Acid Lysine, and Prof. McCullom based his interpretation of his results largely on the lysine content of Gelatine.

At the present time, there is being carried on at the Mellon Institute a very extensive series of feeding tests by Dr. Thos. B. Downey, on the value of Gelatine in the feeding of animals, especially checking up and confirming previous work which has been done along these lines, and so far

these results have been very striking, in that they have shown that the addition of Gelatine to wheat, barley, and rye has very much improved the value of these products. For instance, in one of the experiments on bread a series of animals were fed on a ration consisting of:

White wheat bread.....	96.25
Calcium Phosphate .....	.50
Calcium Carbonate	1.50
Cod Liver Oil.....	.25
Extra. Wheat Germ.....	1.50 (100.00)

and another set of animals were fed on a similar diet, except that Gelatine was substituted in part for the wheat bread, the other diet being:

White wheat bread.....	91.25
Gelatine	5.00
Calcium Phosphate .....	.5
Calcium Carbonate	1.5
Cod Liver Oil.....	.25
Extra. Wheat Germ.....	1.5 (100.00)

Both of these diets contained sufficient protein in quantity and the necessary vitamins, but a very marked difference was found in the matter of growth and reproduction between the two sets of animals. On the diet of bread without gelatine, the development was sub-normal and the young were ab-normal; whereas with the addition of the Gelatine the growth of the animals was above normal and the young were very strong and healthy. A number of other tests have been made using Gelatine in Barley and Rye with the same result, indicating, as has been said before, the fact that Gelatine is an important protein, supplementing satisfactorily the vegetable proteins.

Another important development which has been brought out is the use of Gelatine in Infant Feeding. In 1878 Dr. Jacobi, a prominent New York physician, recommended the addition of Gelatine to cow's milk for bottle babies. A few years later Eustis Smith corroborated the experience

of Dr. Jacobi in this book entitled "A Practical Treatise on Diseases in Children," published in 1884. In this book he stated, "Another plan by which the casein of cow's milk may be made digestible consists in mechanically separating the particles of curd by the addition of some thickening substance, such as Gelatine."

Jerome Alexander has recently explained this effect of Gelatine in milk. He pointed out that casein is an unstable colloid, which is protected from coagulation by a stable colloid, Lacto Albumen, and he shows that cow's milk is low in Lacto Albumen as compared with human milk. Therefore, the addition of Gelatine acts as a protective colloid, so that when the milk enters the child's stomach the acid of the stomach coagulates it in very minute particles, which are readily absorbed and quickly digested; whereas, in ordinary cow's milk entering the stomach it is coagulated in large size curds, which are difficult of digestion and often are not digested at all.

Dr. Herter found that the addition of Gelatine to milk in serious cases of malnutrition was of very great benefit. As a matter of fact, recent literature is very full of reference to the value of Gelatine in connection with milk in infant feeding.

Recently I made some tests on milk containing varying quantities of Gelatine from one-half per cent to two per cent, coagulating the milk with a lactic acid starter, and the difference in the sizes of the curds and the separation of the serum was very remarkable. The milk containing one per cent to two per cent of Gelatine was very smooth in appearance and did not separate at all on standing. You can readily realize that in feeding infants and invalids the physical difference of this curd would be a great factor in its digestion.

In conclusion, I want to say that the work done by the Department of Agriculture in this investigation of the manufacture of Edible Gelatine was undoubtedly of the greatest value to the industry, and the establishment of standards for metallic contamination, although in the beginning seemed a hardship to the industry, has actually proved to be a great and lasting benefit. So that American-made Edible Gelatines are superior to all imported Gelatine in freedom from metallic impurities. I have no doubt but that the establishment of bacterial standards would also be of great benefit to the industry as well as to the consuming public, although this might work a temporary hardship to the industry.

There is no question but what modern developments have shown that Gelatine is a very valuable food as a supplemental protein, and I believe that in the future its use will, undoubtedly, be very greatly extended for this purpose.

A Salesman Student

WHY should a flour salesman learn the bakery business? A year ago when the question was asked in a group of flour salesmen, most of them replied that the flour salesman better not learn a thing about baking, as it would only lead him into disputes with the baker "who might have different ideas."

However, one or two flour salesmen took the baking course at our School of Baking. One of them, since graduating, has spent two whole nights in baking plants "baking bakers out of trouble." A baker could not get the volume he desired. By coming to his plant, after proving in the mill laboratory that the flour he had sold was capable of making greater volume than the baker could get, the flour salesman was

able to demonstrate the value of technical training.

He found the baker operating too cool a dough and underfermenting it. He corrected the baker's formulas, presented him with a tested thermometer, and was able to return in a few weeks to a happy baker who was glad to give another order.

Robert Montgomery, a flour salesman of many years' experience, is now completing our School of Baking course.

"I have often found conditions in which I wished I knew more about the customers' business," he said, in discussing the school and its value to him. "I have already found among my school friends who come from bakeries, new topics and a new basis of understanding on which to share our views. The progressive flour mills of today have a collection of flours for the customer to choose from, each flour being the finest of that particular type the mill can make. And they leave it to the salesman and the baker to agree upon which type best suits competitive conditions and bake shop practice in any given case.

"Once a baker told me he was going to switch his order because the last car of flour I sold him hadn't enough sugar in it. While I knew there was no sugar in flour, I knew also, in a vague way, that yeast did something to starch that was related to sugar, and I determined to find out what it was. I know what it is now and next time I get in a discussion like that I will get right down to business with my baker friend, and see that he gets the type of flour best suited to all types of his trade."

California's Big Plan

IN SOUTHERN California the air has never yet been smoke-clouded into haziness; hence the people see clearly. Bakers of Los Angeles and other cities as far south as San Diego held last year the biggest banquet ever held within the industry.

It was the crowning feature of a week of education in which "bread was glorified" through every known medium of message bearing.

The radio was used in three broadcasting talks, one of which was picked up away down in Houston, Texas. The newspaper advertising columns were used; distinguished speakers were brought from afar; publicity was released in rich profusion; the high schools were shown pictures of the baking industry in action, and parents' associations were told how differently bread is baked today than formerly.

This year it is proposed to "repeat and expand" during the week of January 13 to 20. Bakers from every part of the country should study the "mechanics" of this week's drive. The drivers are experienced in their business. They start with a proclamation of the Mayor. They ask all clergymen to remember the "Bread of Life" in their Sunday sermons.

On Monday their speakers address women's clubs, men's clubs, noon meetings of workers, and high schools. On Tuesday the university field is invaded, and on Wednesday wholesale bakers and retail bakers meet together on problems that interest them jointly; separately on the problems peculiar to each group.

They have brought in famous speakers from other industries, such as Ralph Merritt, head of the Raisingrowers' Association, and Dr. Alonzo Taylor of Stanford University.

Doing Her Bit

A COPY of BAKING TECHNOLOGY came to my desk this morning and my hasty perusal of it left a fine flavor of better bread in my mouth and mind. Also I am interested in the farmer's prosperity and am doing my bit for the Eat More Wheat campaign.

—ELIZABETH STORM, Home Demonstration Agent
Webster County Farm Bureau, Ft. Dodge,
Ia.

New Work for Bread and Meat

Famous Inventor of Lewisite Gas Leaves Northwestern University to Head Research Work of Institute of American Meat Packers

WHEN the world war was still young, and the Germans had flooded the western front with poison gas, and it was seen that the warfare of the future must be a warfare of chemical skill matched against chemical skill, practically all of America's men of science were mobilized for war.

From all sides ideas were flashed in upon the War College. Thus came the idea of the "liberty motor." America would out-fly Germany in the air. Thus came the "Dakin solution." America would save the victims of gangrene, the worst plague of battlefields.

And from Northwestern University, in Evanston, came another idea. W. Lee Lewis, head of the chemistry department, proposed that in a war of gases America out-gas its enemy. He concocted poison gases until he found one more powerful to disable its victims than any gas in use on the western front.

The War Department speedily accepted the plan to fight gas with more gas. It set its forces to work manufacturing both the gas and containers for it. Those were days of secrecy and silence and censorship, but the word "Lewisite" leaked out, as the name of the world's most powerful gas.

And thus came upon the broad horizon of American fame the name of W. Lee Lewis.

From now on W. Lee Lewis is going to be intimately connected with the baking industry. He will leave Northwestern University on February 1st and will then take charge of the Bureau of Scientific Research of the Institute of American Meat Packers. Probably no teacher in the scientific world

in America is more loved by his students than Prof. Lewis. They have departed from his classrooms for the four quarters of the earth.

But he knows them, and they know him, and one of his new tasks in the Meat Institute will be to distribute fellowships, and to encourage and co-operate with scientific research into all forms of meat problems. Thus, as another industry falls into line to take guidance and direction from the world of Science, another great chemist comes directly from the university world into the world of industrial service. It is a joy to record the new work of W. Lee Lewis in these columns, for the present writer was his classmate in Stanford University, when he was young and the world was still a rosy unknown factor before his eyes.

One of the tasks he will have set before him will be the task of tying up more closely the twin foods, "bread and meat." It is well known that bread and meat were closely allied with bread and milk before many other alliances came into the world. It started when it was found that bread could be baked into a good shape to serve instead of a plate. Before platters of china-ware had been conceived platters of baked bread were set upon fashionable tables. And the roast of beef was served on such platters. Afterwards the plate itself was eaten. If it was gravy-soaked it had a special name, and thus "sop" came into the world as a biblical expression.

Toast and Corn Beef

Now with toast and corn beef, bread and roast beef, toasted liver sandwiches, and bacon sandwiches coming into the world

as newly-discovered dainties, W. Lee Lewis will find plenty of work to do in making the tie-up as perfect as possible. The American Institute of Baking has already plowed the first furrow of his new field for him, for Dr. L. A. Rumsey was able to discover through close studies, remarkable new potentialities in toast, if properly made. He discovered the way flavors were lost and destroyed, if toast was made by merely burning and blackening the outside crust, and how splendidly toast would taste if the flavors were sealed in, as they are in beefsteaks, by first searing and then more fully baking, the outside surface. He brought out in a golden-crust toast the flavor made famous in grandfather's parched corn. He found it developed from a caramelizing of the sugars rather than a carbonizing of them. The toast is now ready—the Meat Institute has only to bring on its best meats prepared for combination with toast in the finest possible form.

Welcome Home

It must also be recorded here that no baker could be more in favor of co-operative work with meat interests to bring out every possible co-operative service for bread with meat, than are the leading meat packers themselves. They have completely abandoned comparative and competitive advertising, and all efforts to sell meat save as part of a meal with bread and milk and other standard ingredients to make up the rightful whole. And it must further be recorded that in coming to his new tasks Dr. Lewis finds in Dr. Barnard, head of the American Institute of Baking, an old and valued associate and colleague in the American Chemical Society. They had begun their co-operative work even before Dr. Lewis found out what new tasks were to be his.

Last summer, about the time the Meat Institute found that in Dr. Lewis it could

call upon one of America's most famous chemists and teachers, the little town of Gridley, Butte County, California, awoke to the fact that in Winford Lee Lewis it had contributed to the world one of America's most useful citizens during the crisis of the world war. He was born in Gridley, May 29, 1878. Or, rather, he was born on a little farm a mile north of town. There his father had become a fruit farmer and had hauled his fruit 50 miles south to the growing gold miners' town of Sacramento. Even then there was romance in that frontier community, for the protection from Indian raids consisted of 14 cannon, mounted on the bastions of Old Fort Sutter. And they were not just "cannon" from an ordinary foundry. They were historic cannon which once had glorified the dazzling army of the great Napoleon. As strange as it may seem to find Napoleon's cannon guarding a frontier American town, yet that is the fact. Napoleon had abandoned them at Moscow, when the Great Retreat commenced. The Russians had sent them to the Siberian outposts. Trouble in the Russian settlements of Alaska had led to their being requisitioned for American service. Then came the hunger of the Russians for—what? Wheat. Good, old, staple, hard gluten wheat.

Wheat for Meat Eaters

The Russian fur traders in Alaska had all the whale blubber they could eat. They had all the polar bears they could masticate, and as for seals, they only had to use a club to get an abundance.

But the new research chemist of the Meat Institute will no doubt fully validate the hunger that overcame these surfeited meat eaters. The nearest wheat they could find was on the steppes of Asia. That was too far away. The carrying cost was too great.

So down the coast of California came the Russians seeking a wheat field that would

supplement their meat ration—give them “bread and meat, the food complete.” They found a site. Angry Spaniards rode against them a vaquero army of lasso throwers and spearmen. The site was right west of where W. Lee Lewis was born. It was on Bodega Bay and there the Russians founded the settlement of Ross in 1812. If the Spaniards would insist on riding against them when their hunger for wheat must be met, then they must fortify. But how? Napoleon’s cannon up in Alaska appeared to them as the answer. So all were shipped to Bodega Bay, and they frowned out upon the great wheat field around them, from a substantial Russian fortress.

That was in 1813. The Russians got their making for “the bread of life” from California for the next twenty years. Then the Willamette River Valley came in as a vast wheat field, tilled by the famous white-haired chief of the Hudson’s Bay Company, Dr. John Loughlin.

The Russians ceased to care about the source of a companion food for meat they had created in California. And just then, there came “sloping down over the mountains,” from Missouri, the first of those American pioneers of whom W. Lee Lewis’ father was a splendid example. This first of American pioneers was Captain Sutter. American by adoption, he had been in the body guard of Charles XII, had participated in three glorious days of victorious fighting in the north of Europe before fleeing to America as a Swiss exile.

There came to California at the same time Governor General Sir George Simpson, of Hudson’s Bay Co. He carried in his baggage 30,000 gold dollars.

Would the Russians sell him their collection of 14 of Napoleon’s cannon for gold. Sir George saw in the purchase a chance to gain a territorial footing in California and a war for possession with the “damned,

lawless, rifle-toting, pistol-shooting Americans, who had just wrested Texas from Mexico.”

And Sutter bid also for the cannon, the fort and the farm. What could he give for this wheat field that had saved the Russian fur colonies? He was penniless. He could only give his note! What strange sympathy between Russia and America was it that led the Russian commander to take Sutter’s note and make it for only \$15,000 against a gold offer of \$30,000. We saw this Russian’s sympathy again when the Russian fleet stood off the British fleet and became Lincoln’s great supporter during the Civil War.

Wheatlands for America

Sir George Simpson stormed—and went away. Captain Sutter stormed—or rather built a fort that would withstand all storming Mexicans could devise. He was too good a soldier to want it on flat land. He moved the cannon up to the fork of the American and the Sacramento River. And for two of them he fashioned wheels while he smoked his pipe and awaited—the American day. It came at last in 1846 when hardy American mountaineers took his two brass cannon that had belched fire for Napoleon against Moscow, and turned them on the Mexicans at Monterey and on down south to Los Angeles. They were the center of strength for Fremont’s brave little army that raised the Bear Flag at Sonoma, and the Stars and Stripes at Monterey, when Commodore Stockton of the American Navy authorized their conquest for the United States.

Thus the wheat field that had saved the Russian colonies became the wheat field that made America’s opportunity in California! Sutter took the two brass cannon back into his fort after they had been wheeled to Los Angeles and back, and presently three men came to him, demanding pay for digging a mill race. In dig-

ging that mill race they had discovered gold. They had nuggets, but also they had families over the mountains in Utah. For these three were from General Kearny's "Mormon Battalion," and they wanted the cannon to protect them from Indians on their march across the Nevada deserts. Sutter gave them up in lieu of other pay for the millrace work, and thus the two cannon passed into the Mormon capital at Salt Lake, and out of recorded history.

But the twelve that remained at Sutter's sheltered settlers, while they made a market for fruit among those who mined in "The Mormon Diggings" in an island in the Sacramento, and who pressed on further up the river after gold.

In the Days of Gold

W. Lee Lewis' father came to plant fruit trees at Gridley, and there his famous son was born. When the people of Gridley decided to celebrate his birth last summer they went out to the old Lewis farm. There they found an old oak tree, standing alone beside the main highway. It was always called "The Lewis Oak." It probably was much older than the Lewis ownership or of American ownership of that country, for oaks had long graced those fertile stretches.

Tree surgeons were put to work on the oak, and after much doctoring decided it had 200 more years to live. So the Historical Society shaped up a beautiful bronze tablet. They fastened it to the tree, and for the dedication day they brought home to their community Winford Lee Lewis of Northwestern University, Evanston, and Mrs. Myrtila Mae Lewis, who before her marriage had been a resident of Medicine Lodge, Kansas. The Governor was there for the celebration, and also the Adjutant General of the California State Guard. There was a celebration in the afternoon and a welcome-home dance in the evening. Folks came in for it from 100 miles around.

College classmates of Dr. Lewis came from Stanford University. High school friends came from all through the Sacramento River Valley.

A Memorial Tablet

On the tablet fixed to the Lewis Oak the inscription ran:

Erected in honor of Winford Lee Lewis,

Originator of Lewisite Gas

Born on this property May 29, 1878

And to those of this Community who served in the World War.

An iron fence was built around the Lewis Oak to mark it off as a dedicated tree.

And would it be treason to Scientific Ethics to say that W. Lee Lewis can clog with any vaudevillian, and when he isn't dreaming of some scientific problem is completely amiable and is utterly free from any of the pomposity that has made some certain scientists a group who draw rather apart from life?

He graduated from Stanford University in 1902, we are told by Who's Who, and from the University of Washington with the degree of A. M. in 1904; he took his degree of Ph. D. at Chicago University in 1909. He became an assistant professor of chemistry at Northwestern University in 1909, and became head of the department in 1919. His civic interests are represented by service as chemist, city of Evanston from 1912 to 1918, and his splendid service in contributing Lewisite to the science of gas warfare, by two military positions held through the war. The first was Captain, Chemical Warfare Service, 1917-18, and the second was major, U. S. R., 1919.

His club memberships reflect the range of his interests. He became a Kappa Sigma fraternity man at the University of Washington, and now is a member of the American Chemical Society, the Chemists' Club, Alpha Chi Sigma, Sigma Xi, the City Club, Rotary, and the University Club.

Shipping Boxes for Bread

How Manufacturers Have Worked to Make Them Safe and Sanitary

By GIBNEY OSCAR LETCHER

President, Returnable Shipping Box Manufacturers' Association

WITH the development of modern baking machinery, that enables the modern bakery to turn out 1,000 loaves for every one that the old hand-craft bakery could produce, there has come the problem of shipping, and shipping containers.

Whether the motor truck, the electric truck, Old Dobbin, or the railroad is used, the bread container must come and go with each load. If the container is weak and the bread is crushed, business falls off. If the container is too air-tight molds develop. If the container is not returnable it mounts up into heavy expense. If it is returnable and breakage eats up profits it is not a good type to use.

While motor truck people have worked out good types of delivery vehicles box manufacturers have worked assiduously to find the best kind of container for bread—and for bread and sweetgoods.

When investigation into the best kinds of material for shipping boxes was first commenced the average box made a great many fewer trips before wearing out than the standard boxes of today will make. It is not unusual now to see a box that has made 200 or even 300 trips, whereas the box that had made 100 round trips was formerly a curiosity.

After many kinds of materials had been tried it was finally agreed that a combination of wood and woven wire made the best box for continuous, hard service. Such boxes have been known to make 300 round trips, at a very slight expense cost for upkeep, before finally going to the discard.

Let us consider briefly some of the expense items of the box service for bread

delivery. The initial cost of a box or basket of 100 loaf capacity is about \$6, delivered.

The return express charges on empty bread containers is ten cents, and just here it might be suggested that this express charge includes wagon service to the bakery, although many bakers are still under the impression that they must continue, as under the old express company ruling, to haul their own baskets from the express office to their bakery. If the basket in question costs \$6, and the return empty charge is ten cents, then after the basket has made 60 trips it has in fact paid for itself, and all trips secured from the container over and above the sixty trips reduce the delivery costs of the container to only the empty return charge of ten cents. It thereafter becomes a great money saver for the owner.

For Mixed Shipments

Many bakers have customers who order not only bread but mixed shipments of bread, cakes and pies. Practically all manufacturers of returnable shipping baskets also make pie or cake trays to fit the standard size baskets. By nailing a small cleat on the inside of the basket one tray can be put in, resting on the cleat near the top very much like the tray of a trunk. Thus a mixed shipment of bread, cakes and pies can be shipped by express in a single container without danger of damage to the contents.

All returnable shipping containers are sealed on the loaded trip and the baker, therefore, is practically sure of the entire contents reaching his customer intact. Even the petty thief hesitates to break the

seal of an express shipment. Then, too, the wood and wire woven shipping box or basket (the term being interchangeable), is a substantially built container and there is practically no danger at all of the contents being injured or crushed in transit. The baker pays the express company only on the net weight of the shipment and not on the weight of the container itself. And while the returnable basket is constructed for durability and rough handling by express messengers, it is at the same time light and easily handled. On practically all sizes rope or web handles are now standard equipment.

Express Losses

In a recent excellent article in BAKING TECHNOLOGY by William C. Frazier, of the Department of Agricultural Bacteriology, University of Wisconsin, entitled "An Outbreak of Moldy Bread," this statement is made: "Almost any loaf of bread, if kept in a warm, moist place, as in a bread box, will mold." Of course the writer had reference to the solid box, very likely tin, that is kept in the average kitchen or pantry.

Further on in the article this statement appears: "Proof that the wrappers were not the source of the contamination was given by the fact that molds would grow similarly if the loaf was placed in an airtight box instead of being wrapped." One of the most prominent wholesale bakers in the country said recently, in addressing a gathering of bakers, "Moldy bread will cause you to lose customers more quickly than anything I know of."

Every member of the association of which the writer is president manufactures a container that has sufficient space between the slats to give ventilation to the contents. Yet at the same time these containers are so constructed that the contents of the basket are protected from the weather. It has been said by chemists that bread "breathes," and therefore it must have air if the shipper is

to be sure of its reaching the end of its journey in first class condition and without mold. Many wholesale bakers line their containers with paper before loading but even this does not prevent the bread from receiving sufficient ventilation.

A complaint frequently registered against returnable baskets is that they are lost in transit on the return empty movement, or are retained by the customer for his own use. Frequently express messengers will place bad order express shipments in the first empty bread basket they can get hold of and send this basket to some other destination. Hence the shipper is minus a basket.

These matters can easily be avoided by the shipper if the matter is taken up with the customer at the start, and he is given to understand that he is charged with the basket until it is returned. Then have him insert the number of the basket on the express receipt, so that if it is lost or damaged on the return movement, the shipper can file a claim against the express company. All shippers should have their baskets numbered, for which the manufacturer makes no additional charge or else a nominal charge. If this is done then a simple card index system can be installed so that the shipper not only will know how many trips he is securing from his container but at all times he will know where each basket is.

The Baker's Color Scheme

A wholesale baker, when ordering his baskets, can have them attractively lettered and numbered and either painted or varnished. He can carry out on his baskets if he desires the color scheme used on his bread wrapper or his trucks or wagons. I think an attractively lettered shipping basket, either painted or varnished, is the cheapest means of advertising that a wholesale baker can secure, because a large part of the life of a returnable container is spent either in transit or in front of the store of

some customer at a distant point, or on an express wagon or railroad station platform. Some one has said that a shipping basket is a traveling signboard.

The Servant Question

The servant question with the average American housewife in all sections of the country is becoming more troublesome every day. Those bakers who have uniform quality in their bread and render prompt service, can expect a steady increase in their shipping business.

At least the best thought of the shipping box manufacturer is in agreement that this is so. We are glad of a chance, through BAKING TECHNOLOGY to inform the members of the baking industry how our industry is co-operating with theirs and of the faith in which we are proceeding in our development.

From Canada

CANADIAN bakers have apparently been slow of late to show their pre-war interest in baking affairs this side of the border. This general attitude lends special interest to a letter received at the American Institute from the Malt Products Co., Ltd., of Guelph, Canada. The company asks for much information about baking problems and adds: "We congratulate you on the very good work you are doing and on the favorable comments being made not only in the trade but in current chemical literature as well. I think we should be members of the Institute; if that is possible will you be good enough to send us particulars."

Out in India

The latest applicant for information about our School of Baking is T. M. V. Kannuswamy Pillay of Theradikadia Street, Teppakulam Post Office, Trichinopoly, Madras Presidency, S. India. He saw the advertisement of the school in *Bakers*

Weekly and hastened to ask for an application blank. This prospective student has been in the business of supplying South India residents with machinery, and has evidently decided that modern ways must soon invade even his distant territory.

Help from Savannah

WE ARE paying our dues most cheerfully to the Association because we know it is a tower of strength to the baking industry. Don't forget to make our reservations at each National foregathering.

—J. H. QUINT, President the Schafer Bakery,
Savannah, Ga.

New Work on Yeast

MESSRS. Winter and Smith, with Dr. Devereux-Forrest, recently showed that there is present in the blood of normal persons a sugar that is not present in those suffering from severe diabetes mellitus. From the effects that extracts of pancreas and liver were found to have on this sort of sugar, and because phosphates which occur abundantly in yeast were found to activate the extracts, the possibility was suggested that yeast would yield a substitute for insulin.

The production of a substitute for insulin from yeast is considered a great step in advance, for it is expected that it will greatly reduce the cost of preparation of an anti-diabetic drug. Insulin is almost prohibitive in cost, since it is difficult to prepare and must be taken continually. Furthermore, yeast is a source far less likely to furnish, along with the desired extract, such dangerous toxic substances as have caused trouble in the case of the pancreas extract.

Yeast is today the source of a number of interesting and possibly valuable substances which are being studied at various labora-

tories in America and abroad. Dr. Atherton Seidell in Washington at the Hygienic Laboratory and others are preparing from this substance one of the important vitamins, and making studies of this life-factor in its effect upon pigeons. At Cambridge a year ago Professor Hopkins, the English biochemist, isolated from yeast a substance which was named glutathione. This is receiving much attention because it is one of the necessary factors in the respiration of living cells. By means of studies with it our knowledge of the chemical mechanism of cell life is being greatly increased.

—From *Science*

Bread in the Home

WHEN will foolish editors stop talking of "home-made bread and baker's bread," as if there were only the two classes and all bread was alike in each class?

"Another thing that should be considered," writes the editor of the Springfield, Ill., Register, as he breaks away from the conventional lines, "is that bread-making is an art that even under the best tuition is mastered only by a minority of housekeepers.

"Therefore ON THE AVERAGE the product of the baker is superior to that baked at home. Another thing that should be considered is that the cost of making bread is not altogether a question of the cost of flour or other material used, but also the cost of labor which in the baking business, as well as in other branches of manufacturing, is higher than usual. Under present industrial and domestic conditions, the baking of bread, like the preparation of many other articles of food, cannot be conveniently and profitably carried on in many homes."

We receive BAKING TECHNOLOGY and think it a wonderful paper for bakers.

—Z. A. ZELLER (Webben & Zeller, Wholesale Bakers, Shelbyville, Ind.)

New Baking Students

RESULTS obtained by bakers, millers, and supplies men who have sent students to our School of Baking justify them, of course, in spreading the word of the school's usefulness among their friends.

"Please send me," writes E. B. Nicolait of the Production Service Department, Quality Bakers of America, New York, "thirty more enrollment blanks for students intending to attend your School of Baking. We will distribute them among our members in an effort to enlist as many young men as we can in your next course. We are trying to send you seven for the next Term."

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

OF "BAKING TECHNOLOGY," PUBLISHED MONTHLY at postoffice at Chicago, Illinois, for October 1st, 1923. State of Illinois, County of Cook, ss.

Before me, a notary public in and for the State and county aforesaid, personally appeared I. K. Russell, who, having been duly sworn according to law, deposes and says that he is the editor of the "Baking Technology" and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are: Publisher, American Institute of Baking, 1135 Fullerton Ave., Chicago, Ill.; editor, I. K. Russell, 1135 Fullerton Ave., Chicago, Ill.; managing editor, none; business managers, none.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) American Institute of Baking, a corporation not organized for profit; H. E. Barnard, secretary and business manager; M. Lee Marshall, treasurer; J. M. Livingston, chairman; L. F. Bolser, first vice-chairman; A. H. Hathaway, second vice-chairman.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: (If there none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

I. K. RUSSELL.

Sworn to and subscribed before me this 27th day of Sept., 1923.

(SEAL.)

ROSABELLE E. PRIDDAT.

(My commission expires Aug. 24, 1926.)

Books for the Baking Laboratory

BREAD, ROLLS AND SWEET DOUGHS. By Paul Richards, author of "Cakes for Bakers," "Pastry Book," "Baker's Bread," "Pastry for the Restaurant," and other books on baking. Bake Shop Library. Bakers' Helper Co., Chicago, 1923.

This is a very handy volume of seven by four inches, embracing 226 pages with an index, which should be of considerable usefulness to the practical baker. Mr. Richards, its compiler, has had a long experience in presenting baking information to the readers of Bakers' Helper. According to the introduction this book "represents the sum of his best efforts in the line of breads, rolls and sweet doughs to meet present day demands." He has been guided in its preparation by the desire "to present the things most helpful to the baker in his daily work, to instruct and caution him regarding the handling of quality products in the process of manufacture, and to emphasize the most necessary in successful shop practice. Every formula has been selected because of its proved popularity,—its known selling value."

The scope of the work includes the subjects of flour, other bread ingredients, fermentation, mixing, bread formulas, rolls and bun doughs, sweet doughs, English hot plate goods and useful tables for calculating amounts and batches of the various doughs.

The final section of the book gives a number of hints on how to avoid and correct bread troubles, and suggestions on shop management, concluding with an essay by George W. Skiles of Milwaukee on utensils and their care.

On the whole Mr. Richards has compiled a highly useful volume, although there are some statements which require some comment, as for example, on pages 86 and 87, which state formulas for milk bread made in accordance with the federal standard. In the formula given for whole milk bread, the amount of whole milk powder there stated, $5\frac{1}{2}$ pounds, is somewhat low in relation to the 58 to 60 pounds of water indicated, since 58 to 60 pounds of liquid whole milk would contain from 6.8 pounds to 7.05 pounds of whole milk solids, calculated on the basis of 11.75 per cent, the standard for whole milk.

Further we read that $2\frac{3}{4}$ pounds of skim milk powder may be used in making a one-third milk bread, the government standard. This is also incorrect, as the federal definition states that

one-third of the water ingredient should be replaced by milk or the constituents of milk solids in proportions normal for whole milk.

It is thus evident that $2\frac{3}{4}$ pounds of skim milk powder would be deficient in the butter fat of whole milk solids, and in order to make government standard milk bread a correction should be made by reducing the skim milk powder to include the correct proportion of butter fat which must be added.

While the amounts of powdered milk specified in both cases may be due to typographical errors and not to any misunderstanding of the facts by the author, the reader without special knowledge might be led into error by following these formulas.

A surprising amount of technical information has been collected in this handy volume, and we are glad of the opportunity to bring it to the attention of the readers of BAKING TECHNOLOGY.
C. B. M.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Action of Yeast Types Isolated from Butter on the Constituents of Milk. A. E. Sandelin. Ann. Acad. sci. Fennicae 19A, (3) (1922).—Various types of yeast isolated from butter (cf. Ann. Acad. sci. Fennicae 12A, No. 6) were examined with regard to their action on the various constituents of milk both when grown alone and in mixed cultures with *Streptococcus lactis*. All the yeasts used were *Torulæ* according to Hansen's classification with one exception, which was a *Mycoderma*. The yeasts could be divided into groups according to their action on the constituents of milk. No type was found to act on all the constituents of milk-fat, sugar, and casein.
J. S. C. I.

Disinfection in Food-Products Factories. H. F. Zoller. Am. Food J. 18, 247-9 (1923).—The general sanitary conditions of food-products factories are discussed, including the subject of bettering conditions by the elimination of carelessness and by disinfection. Ten chemical disinfectants are discussed and the advantage of NaClO are pointed out. It has no value as a food preservative and should not be used as such.
H. A. LEPPER.

Some Notes on the Determination of Protein.

R. B. Potts. J. Am. Assoc. Cereal Chem. 8,66-9 (1923).—P. gives the results from 21 replies to a questionnaire sent out to 25 chemists. The questionnaire was accompanied by a sample of flour for the determination of protein according to the method employed by each chemist. The amount of protein in this sample as reported varied from 10.95% to 10.28%, average 10.6%. The questions were as follows: (1) What method of nitrogen determination was used? State the reagents used and the amounts of each. Five variations in methods were reported. The use of Cu tended to give the lowest results. (2) Approximate time of digestion. The time varied from 20 to 90 minutes. (3) Approximate time of distillation. (4) Capacity and type of flasks used. These varied from long-necked Kjeldahls to globe flasks with short neck also from 800 cc. flasks to 500 cc. flasks. (5) How much correction do you use as determined on blank? This varied from 0.6 cc. of 0.1 N acid to 0. (6) Do you distil your NH_3 into an excess of acid? This was answered yes, unanimously. (7) What normality of solutions was used? 19 used 0.1 N solutions. (8) Do you standardize your acid or alkali? 15 standardized the acid, 5 the alkali, and 1 both. Those using an alkali standardization showed a tendency to run lower. (9) State method and reagents used in the standardization. 13 used the BaCl_2 method, 3 used K-bitartrate in the alkali standardization, 2 used Na_2CO_3 , 2 used oxalic acid, and 1 benzoic acid. The chemist using benzoic acid gave the low result of 10.28% protein. (10) Have your burets been standardized with a Bureau of Standards buret? Only 8 had been so standardized.

J. A. KENNEDY.

Of How Much Value Is the Protein Test?

L. R. Olson. J. Am. Assoc. Cereal Chem. 8, 91-4 (1923).—O. discusses the proteins found in wheat flour and touches on the blending of flours. The protein content is indicative of very little unless accompanied by a statement about the quality of gluten. From the two a good idea of the value of a sample of wheat can be obtained. This is in a greater measure true of the manufactured flour. Bread is the final test of flour.

J. A. KENNEDY.

The Physico-Chemical Properties of Strong and Weak Flour. LV. The Influence of Ash of Flours Upon the Viscosity of Flour-in-Water

Suspensions. R. A. Gortner and P. F. Sharp. J. Phys. Chem. 27, 567-76 (1923).—The inorganic salts tested depress the viscosity produced by lactic acid in flour-in-water suspensions. The depression is not due to anion or cation nor solely to valence. With suspensions washed free of minerals there is an increase and an equalization of the effect of the monobasic acids. A p_{H} value of 3.0 is the optimum for imbibition with acids, while with NaOH and $\text{Ba}(\text{OH})_2$ the optimum is 11.0. The electrolytes present in the flour have a greater effect in the presence of acids than alkalies. The imbibitional properties of the gluten proteins are best studied in suspensions from which the soluble ash has been removed by leaching.

BURTON G. PHILBRICK.

PATENTS**Preserving Vitamins of Cereals.**

D. Chidlow. U. S. 1,461,703, July 10. The vitamins of the germ or scutellum of wheat are preserved by heating the material to a temperature of about 132° for a sufficient time (usually about 15-20 minutes after a preliminary drying at a lower temperature) to render the material immune to destructive action of the air.

Treating Wheat.

C. W. Chitty and Woodlands, Ltd. Brit. 191,473, Oct. 12, 1921. Wheat, before milling, is treated with a halogen gas or with a gaseous compound containing available halogen, such as Cl , HCl , or phosgene. The wheat is agitated in a drug or worm and 2-4 oz. of commercially pure Cl , etc., per sack of wheat is introduced. A larger proportion of Cl may be employed if the treated wheat or flour produced therefrom is to be mixed with untreated material. Cf. 1661, 1901, 8091, 1903, 14,757, 1903, 16938; 1913 (C. A. 9,338) and 168,938 (C. A. 16, 448).

Yeast Food for Use in Dough.

W. A. Geere. U. S. 1,431,156, Oct. 10. The germ of wheat, barley, oats, maize or dari which has not been heated sufficiently to injure its enzymic content, 60 parts, is mixed with starch 10, $(\text{NH}_4)_2\text{CO}_3$ 1, a cereal meal 26 and $(\text{NH}_4)_2\text{HPO}_4 \cdot \text{NaH}_2\text{PO}_4$ or other phosphate 3 parts.

Bread.

W. B. Johnson. U. S. 1,438,441, Dec. 12. A liquid mixture of whole rice, wheat bran and H_2O is cooked and after partially cooling is mixed with yeast and malt sirup, permitted to ferment in liquid condition with ready escape of the gas formed, then mixed with flour, re-fermented as a dough mixture and baked.

Helping a Woman Test Bread

EVERY modern baker knows that the modern baker's loaf was made through intensive study of the modern woman's home-made loaf. Bakers went to the homes of their customers with the old-fashioned baker's loaf to the 90's and asked why the women did not like it. They found out and went to work to make one she would like. That is why bakers now bake twice as much of the nation's bread as they did a decade ago.

To the American Institute of Baking came one of the most prominent club women in Illinois. She was a specialist in home economics, and she knew that it was no longer economical to bake at home. Her time had become worth more to her at other things than in bending over a bread pan.

Yet all she knew about bread was that she had found a loaf selling for 15 cents, against a standard price of 10 cents for most other breads of similar weight. She saw bread scored at the Institute and saw the best loaves picked from the group of bread arriving daily. She sent in two loaves of her favorite bread for which she had been paying a premium price.

How did it compare to the product of bakers in general? Here is what the lady found: that it was better than the usual baker's loaf—in price only; that the score was among the lowest given at the Institute; that other qualities were practically all subnormal.

One of the loaves scored 77.5, the other 75.5. The report sent to the inquiring lady by Dr. H. E. Barnard, director of the Institute, contained these paragraphs:

"The loaf was a rough looking loaf. The grain was the poorest of any bread we have seen for a long time,—coarse and

crumbly. The color of the crumb was very dark, giving the bread the appearance of a loaf made from a clear or a low-grade flour. This, I think, however, was due to the unsatisfactory method of fermenting rather than to the quality of the flour used.

"The flavor was lacking, whereas it should have been distinctive and the taste was not as good as that of the average bread which comes in to us from all parts of the country.

"The average score of bread baked in the city where these loaves were baked is 89. This, you will note, is decidedly higher than the bread in question.

"My honest opinion is that the average bakers' loaf is very much better in quality, in character, and in every other way, except that since it is sold wrapped the crust is not so crisp. This may be one of the reasons why you prefer this loaf."

Then came the question of why the women preferred this loaf. Could it be that they were laying aside all that they had preached and fought for in their long advocacy of wrapping bread as a sanitary measure?

It was found that the bread had been made from a very old dough, and so far as they had any taste it was one of sourness.

It seemed that here was work for the Institute to do. Why do women choose one type of bread above another? The Institute's director at once got in touch with the group of club women whose leader had made this inquiry. He proposed that the women arrange for a meeting at which a spokesman for the baking industry could be present, to stage a general demonstration of bread scoring.

BAKING TECHNOLOGY

*A Journal of
Applied Science
in Baking*



*Published by
The American Institute
of Baking*

Vol. II

CHICAGO, ILLINOIS, DECEMBER 15, 1923

No. 12

Toast—for Christmas Dinner

INTO how many thousands of homes this Christmas will electric toasters and gas toasters make their way where they never have been before? And on these devices how many thousands of people will get a new introduction to an old friend—the piece of rich, brown toast that has the fine flavor of parched corn instead of the poor flavor of ashes and burned bread?

As these words are written Grosvenor Dawe of the Wheat Council of the United States is touring New England in the interest of toast. He has a total of 100 cities under his care and in each of them groups of people are work-

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ing together in bigger units than they ever worked together before to promote the use of wheat foods—and especially at this time of toasted wheaten foods as the most immediate outlet for America's surplus wheat supply.

And while Mr. Dawe is working up in New England with the help of bakers like Alton H. Hathaway, and gas men like J. D. Clark, hardware men like L. W. Thompson, yeast men

like C. W. Wickersham, flour men like H. S. Levinston, Sam Watters, a leading Pennsylvania baker, is working in the same spirit in the Pittsburgh district.

Similarly Kansas City is beginning to

move forward into a campaign for more toasters and more toast, while Ohio cities have just completed a splendid campaign. Reports from Texas show that Henry Stude is taking the leadership in Houston, while New York is developing committees on co-operation.

Flashes from the field show what can be done in the terms of what has already been done.

Henry German of the Henry German Baking Co., Wilkes-Barre, hurried through with a whole toast campaign all by himself. He applied to the electrical men for co-operation and the power companies. But they were not as alert as their colleagues have been in almost every other community. So he went ahead alone. He obtained the co-operation of the grocers, and through them marketed 18,000 low-cost toasters in two months. During the third month he counted his business as compared to other months. He found that as compared to November, 1922, it had increased \$2,000 per week. The bread was the same. The usual selling conditions were the same. The difference was that in 18,000 homes there was a convenient way for making toast that had not previously existed.

The Chicago Opening

The fine thing about Chicago's first week of concentrated toast campaigning was that it was regarded on all sides as merely the beginning.

At the end of the week electrical company display advertising was just being brought into action, while baking companies were using the first week's lessons as data on which to build more strongly for the second week.

What happened in Chicago may serve as a model for a great many cities and therefore the story is reproduced herewith in some detail.

One radio broadcasting station scorned

the idea of broadcasting news of this great movement. Two others gladly threw open the doors to Wheat Council Broadcasters. The station that had at first feared the proposal as an "advertising" idea learned from what came over the air from other stations about its fundamental soundness, and about the spirit of public service in which a great many factors, from cabinet members to farmers, had combined to put the largest percentage possible of America's wheat surplus into consumption.

Then this radio station's management overcame all doubts and opened the station to broadcasting for the Toast Campaign. From the two stations that did engage in broadcasting, housewives in towns many hundreds of miles from Chicago learned how to make the cheaper cuts of meat into mince fillings for toast, and thus serve them as attractive portions at the family dinners.

The keen interest of housewives in using more toast and learning the many uses that may be made of toast was indicated by postal cards sent in as a result of the broadcasting service. The women wanted recipes, such as any baker may put with his loaves of bread, inside the wrapper if he wishes to. The Wheat Council has published a book of recipes of just the kind that is called for and has them for sale to bakers at a very nominal cost.

Mrs. Fribley's Part

How a woman holding a responsible place as a leader of women in women's work could and did help the toast campaign was well indicated in the case of Mrs. Wilbur E. Fribley of Chicago. Mrs. Fribley is chairman of Home Economics of the Illinois Federation of Women's Clubs. She became intensely interested in the movement to get more wheat into consumption because she recalled that all through the war all women of her organization, including

herself, had done their utmost to take wheat out of consumption. Now she felt the call to "reverse English on the war" and get it back into consumption.

Toast appealed to her as the most likely way to increase wheat's use immediately, because as a woman having many public duties she had learned the value of a quick toast dinner or luncheon or tea party.

Mrs. Fribley wrote letters to all women's clubs in Illinois heartily indorsing the movement, not only as one that would help wheat farmers and those who handled their product between farm and consumer, but one that would assist women in the art of making quick, tasty meals as well.

The Gas Gazette

The *Gas Gazette* is a paper that goes into every one of Chicago's 70,000 gas-using homes. It goes in with each gas bill. It featured toast and a gas toaster where no gas odors can penetrate the toast while it is being made.

Of these toasters 5,000 were sold while the campaign was just unlimbering and on that showing 25,000 toasters were assigned to each district for the campaign period.

Butter Men Score

The makers of Blue Valley butter were not a bit behind in coming forward with the slogan "Blue Valley Butter Makes Toast Better." They flew it on all their wagons and had window cards made to carry it.

Bakers also helped by providing splendidly printed window cards for the grocery trade.

The milk men did not bebanner milk wagons featuring milk toast at first but had the matter under earnest consideration and hoped to come along a little later in the campaign.

A Jelly Man's Aid

When John Burns went to Kansas City to organize the bakers of that section and

start them off in the right direction, the most attentive listener he had was a jelly manufacturer. The jelly man decided that this movement was one of the soundest he had ever heard of. He immediately wrote every salesman in his employment and every grocer buying from him, why he thought it would be a fine service to "urge the use of toast and toasters in great quantity."

Odd Bits of Help

As the toast campaign got under way odd bits of toast information came to the surface.

N. G. Symonds, general manager of the Westinghouse Electric Co., in Chicago reported that in his house bread had always been left over after each meal. With his boys away at college the family could not consume its loaves in full. But when the toast idea came along his wife began to serve various dishes on toast and to serve toast with the meal. The result was the immediate consumption of every crumb instead of having half a loaf left over each day to go stale.

Another man who had found sandwiches attractive had taken to putting the cut portion of the supper loaf of bread in the refrigerator over night. Then in the morning he would cut it up for toasting—but not across the grain. Instead he would cut the slices the long way of the loaf. He said that he found that if slices were cut this way, and put right out of the ice box on the toaster, they took on a crisper and better flavor than toast as ordinarily made. Tests were immediately commenced to find out if this method increased toast's appeal to any general number of users.

The New England Plan

Grosvenor Dawe, Secretary of the Wheat Council, explained to New England audiences in many towns why the Wheat Council adopted the toast campaign as the first

stroke in its general and nation-wide campaign to bring more wheat into consumption. He also explained that the Wheat Council was making a year-long task of the enterprise and was manning its forces with experienced men, one of whom, Dr. L. A. Rumsey, had been "borrowed" from the American Institute of Baking. It was Dr. Rumsey who intensively studied toast until he found that "flash toasters" made only an ashy toast, of bad flavor, while slower application of heat duplicated in bread the fine parched-corn flavors of grandfather's day. The effect of his researches in giving the electrical manufacturers a basis on which to abandon "flash toasters" as a standard, made him the *ideal* man to place in charge of certain phases of the toast campaign.

To get "flash" toasters out of hotels and restaurants and replace them with toasters taking at least three minutes for their work of making finely flavored toast, will be one of the objectives of the big campaign before it is over.

After toast what campaign is next? The opportunities seem endless and as soon as the toast campaign is handled the men who have come together for common service in the wheat field will want to tackle the next most promising campaign. Many insist that a sweet goods campaign would be the most appealing. It has already entered largely into the toast campaign, as toasted sweet goods have been found to be delicacies finding wide favor.

How Toast Helped

WOULD you expect the introduction of toasters to make a big difference in the dietary habits of 1,200 cadets in the mess hall at West Point? Yet that has happened. At the military academy supervisors of the dining room noticed that bread was usually left over after each meal.

It was decided to serve toast instead of

bread at some meals and four large automatic toasters were provided for the West Point kitchen. A visitor who has noticed conditions there writes to BAKING TECHNOLOGY:

"The writer has observed how the Academy boys wasted bread and rolls. But since the four big toasters were put in, making plenty of toast for the 1,200 cadets, not a single slice of toast has been left on the table.

"We have noticed the same thing in the Hotel Astor in New York. The toast has been eagerly eaten to the last crumb. I believe the American Institute should call attention to the increase in bread consumption that follows the installation of toasters in large-unit eating places."

Needless to say the Institute is having the situation studied with a view of broadcasting the findings to the hotel and restaurant groups. Editor Patterson of the *American Restaurant*, was one of the earliest and most eager friends of the "Toast For Breakfast" campaign. He printed an important article in the December number on the use of toast in restaurants. In it he included all data furnished by the American Institute, as well as an article by Dr. Barnard, the Institute's director, on advantageous uses hotels and restaurants could make of bread in all its forms. The new co-operation between hotels and restaurants and the American Institute of Baking is one of the fine factors of our new and recent growth.

As to a Name

How good a bit of news is this for American bakers? Our latest recruit to the membership rolls is the "A Loaf Baking Co."

If marks had their pre-war value the raise in the price of a loaf of bread in Berlin on one day in December of this year would have been \$110,000,000.

Gimme Toast/

Baby's first solid morsel—Childhood's mainstay—Oldsters delicious food—"toast and"—!

Children above all should eat appetizing and nourishing toast combinations.

"Remember," says Mrs. C. M. Johnson, Chairman of the Department of Home Economics, Congress of Women's Clubs; "Nature does not discriminate between rich and poor among undernourished children.

Make them eat breakfast, even if you have to send them to school eating a toast sandwich on the way."



This is one of a series of advertisements instigated by the Wheat Council of the United States, to increase wheat consumption and stabilize the market for the farmer, for better business.

Industries whose products may be eaten with toast are co-operating in this great movement by linking up their advertising campaigns with it.



Under any circumstance, on any occasion, in every home

Every Spread is Better with Toast

AN ADVERTISEMENT THAT GLORIFIES TOAST

It Was Prepared as Part of the Pittsburgh Toast Campaign but Can Be Adapted for Use in Any City Where a Toast Campaign Is Planned on a Co-operative Basis

Our Breadstuffs Industry

A Forecast of How Its Factors May One Day Work Together, to Fulfill Present Day Promises

WHEN William C. Edgar completed the fortieth milestone of progress in his personal service in building up the paper which tells to the world the story of America's giant mills beside the Mississippi, three special trains rolled into Minneapolis carrying those who wished to do him honor.

And who came aboard them? Bakers. Bakers saw that milling progress meant baking progress. Wheat men. Wheat men saw that milling progress and baking progress could be made to mean farm progress. Railroad men. Railroad men saw that farm progress, milling progress, baking progress, meant transportation progress. Steamship men. For steamship men saw that farm progress, milling progress, baking progress, railroad progress, meant steamship progress, with heavy burdens of golden grain routed to foreign ports.

And so the groups came together. The gathering there found everybody on a common footing. What it all meant was summed up for us beautifully by one of the staff of the same splendid paper whose fiftieth anniversary was then to be celebrated.

"No special insignia or mark distinguished the baker from the miller," noted *The Northwestern Miller*, "the railroad president and the grain merchant alike wore the badge of the guest.

"Out of all this arose an extraordinary sense of unity. The baking industry and the milling industry, as such, were for a while forgotten in the vision of the industry which provides the people with their daily bread.

"Outwardly the departments of this in-

dustry appear to have little closeness of relationship; sometimes, indeed, it has seemed as if their interests involved a certain degree of mutual antagonism. Underlying all this superficial diversity, however, is the great unity of common service. The man who raises the wheat, the man who makes possible its distribution, the railroad which transports first the wheat itself and then the product manufactured from it, the miller who grinds it into flour, the dealer who brings it to the final purchaser, and the baker who converts it into bread and other forms of food, all are simply parts of one immense organization.

"Some perception of this unity was provided in the fellowship of the three days at Minneapolis. A few months ago a speaker at the convention of American Bakers Association at French Lick concluded his address by saying that **some-day there will be a great trade convention of the Daily Bread Industry.**

"When that convention assembles and its members get together in real friendship and accord, then the problem of increasing America's bread consumption will be virtually solved. It was just such a convention that was foreshadowed last week.

"This means that year by year, and month by month, the bakers and millers, the grain merchants, railroads and flour distributors, are all achieving a greater degree of harmony in their joint enterprises. For the bakers, above all, it means that the line between them and the millers is constantly growing fainter.

"In the past the baker has too often thought of the milling industry much as

the zealous shopper thinks of a group of competing department stores—in other words as a field for jealous bargaining.

“Today the success of the flour mill depends on the ability of the baker to merchandise its product. The full realization of this fact is gradually creating a new spirit in the relation of the millers to the bakers. They see them no longer simply as customers but as business partners.

“As the sense of unity of service grows ever deeper each baker will establish closer and more friendly relations with the miller who supplies him with his flour. He will look less for cheap bargains, no matter whence they come, just as he would now never think of going from lawyer to lawyer to find which one would handle his case for the smallest fee.

“Prosperity for baker and miller alike demands the consumption by the American people of more bread, bought at a fair price. This means better bread with the cost of manufacture stabilized by an equitable distribution of expenses and profits. Only by working closely and harmoniously together, in an alliance based on the sense of common service and mutual dependence, can the bakers and millers give the people such bread as they ought to have, and at a price that shall be fair to all alike.”

How It Was Done

OF ALL gatherings to honor magazines and magazine makers none ever could compare with the gathering at Minneapolis to honor William C. Edgar. While editing a trade paper, he had made it more complete in its art work than the best of the magazines devoted to art alone; while not professing to be a literary magazine it had published some of the world's best literary gems. Its editor could speak in terms of praise and friend-

liness toward almost all of the accomplishments that embellish and brighten human life.

How was it all done? A letter from BAKING TECHNOLOGY to Mr. Edgar asked if he would write out the map of the faith that had guided him through the forty years of his service. His answer was a letter, which said:

“Even if I had the time to undertake any writing outside of my editorial duties, which I haven't, I don't know that I could put in words the animus or spirit which has caused me to do the little which I have accomplished.

“It has been a simple and direct process in my mind, very ordinary and very commonplace. If you ever read Howell's *Rise of Silas Lapham*, you will recall that Lapham, a paint manufacturer, ‘believed in the paint,’ and this was the reason he did so much with it.

“I believed in the *Northwestern Miller* and thought there was no limit to its usefulness—so I just went ahead developing it, idealizing it, trying to make it represent the latent spirit which I believed to exist in the industries it was trying to serve.

“So the years went by in happy and congenial occupation and the other day when all those fine people came together and proceeded to praise me, I give you my word I was very much astonished and nonplussed.

“I don't believe I could say anything more about the spirit of what has been done if I wrote pages. A thing I am thinking about very earnestly is what remains to be done in the future and how to do it. I want to make the *Northwestern Miller* far more useful and praiseworthy in the future than in the past. The first fifty years is over and done for, and the next half century lies ahead, with far larger opportunities.”

Animal Tests in Nutrition

Why the American Institute of Baking Seeks New Facts About Bread

By R. H. SHAW

Department of Nutrition, American Institute of Baking

FROM many sources articles about bread are pouring in upon the American Institute of Baking. Some are by pseudo-scientists and some by lay interpreters of the work of such men as Dr. McCollum of Johns Hopkins and Dr. Sherman of Columbia University. It was from such writers that Dr. McCollum prayed he might be delivered when he addressed to American bakers a statement that he had never disparaged or discouraged the eating of white bread but had only urged that it be supplemented, as it always has been in practice, with butter, milk, and the green fresh vegetables needed to make, with bread, the complete ration.

To find out the nutritive quality of all types of bread, the American Institute of Baking has established a laboratory for the test feeding of animals. It is in charge of Prof. R. H. Shaw.

He here sets forth the newer studies of foods which demonstrated the value of and the necessity for such tests.

The science of nutrition, especially that part of it concerned with the proteins and those mysterious somethings which for the want of a better name we call "vitamines," has been almost revolutionized within the last twenty and nearly within the last ten years. Only a few years ago proteins were proteins and, regardless of their source, were esteemed to be of practically the same value as a food constituent. We knew indeed that they differed in their chemical characteristics, but not until the end of the nineteenth century, when Emil Fischer began his

classic researches, did we realize how fundamental these differences are. Strange to say, a hint at these differences was found way back at the time of the French revolution. At that time France was severely pushed for her food supply. Meat, which was the chief source of protein, had become prohibitive in price for the poorer classes and a cheaper source was imperatively needed. An interesting story could be written of how some of the bright minds turned to gelatin as this source.

Is not gelatin a protein, reasoned they, and are not tons of bones from which it may be obtained going to waste? It seemed that the problem of cheap protein had been solved, but when they fed it to the sick in hospitals, which apparently were the subjects for experimentation in those days, the sick, instead of becoming better, became sicker. And so the dream ended. They did not know at that time why gelatin cannot be used as a sole source of protein. We do today. Modern research has shown that proteins are very complex substances. When acted upon by the digestive processes of the body they are broken down into substances called amino-acids. There have been about eighteen of these amino-acids isolated from the hydrolysis of proteins. Some proteins contain nearly or the entire list. In others some are lacking and no two proteins contain amino-acids in the same proportion. The Germans have a good name for these amino-acids. They call them Bausteine or building stones. The body cannot manufacture these building stones. It must procure them from

the proteins presented to it in the food. If, therefore, the necessary amino-acids are not at hand both in kind and quantity, the body cannot construct its own protein. Normal growth cannot take place.

In the Blood Stream

After the amino-acids are produced from the proteins in the process of digestion they are taken up by the blood stream and carried to the various cells where they are used for purposes of repair and in building that particular kind of protein the cell requires. Years after the French people found that gelatin will not serve as a sole source of protein, scientists found that it is lacking in two of the more common amino-acids, one of which has been proven to be absolutely necessary for life. When these amino-acids were added to gelatin it was then found to support normal growth. A vast amount of work has been done in the last few years on proteins. At the present time a laboratory in the Bureau of Chemistry in Washington is devoted entirely to the study of the amino-acids in proteins from various sources. Similar work is also being done at several universities and experiment stations. From the modern viewpoint we are no longer solely concerned with the quantity of protein a food contains, but even more are we concerned as to whether or not that food contains protein which will yield amino-acids in kind and quantity to build the body proteins.

The Role of Fats

In a paper of this character only passing reference can be made to the other long recognized food factors: the carbohydrates and fats which serve as fuel to the body and the mineral constituents which supply certain special needs of the body, such as lime for the bones and iron for the blood. They are all vitally essential. No revolutionary discoveries in

these factors have been made within recent years. Fats have, however, taken on a new significance since some of them have been found to be carriers of one of the vitamins of which more will be said later.

It may seem somewhat paradoxical to speak of the discovery of something that has never been tangible to any one of the five senses, but perhaps the greatest discovery in nutrition of the century is vitamins. No one has ever seen them. We don't know what they are or how they act. We do know that life cannot exist without them and we have traced them to some of their lurking places. We have always eaten them but didn't know it. As with the recent discoveries with proteins hints were found many years ago that there were mysterious "somethings" in food that were not made evident by the most careful chemical analysis but which were absolutely essential to life. Scurvy is a disease of ancient origin. In the olden days it was the scourge of sailors on long voyages or those deprived of fresh vegetables for long periods of time.

It was found long years ago that it is caused by the lack of fresh vegetables in the diet. If fresh vegetables were provided the trouble disappeared. Even a little orange juice or the juice of the lemon or lime would prevent it. This is perhaps the first of the so-called deficiency diseases to be recognized. There is something in the fresh vegetables or fruit juices that could not be detected by the most refined chemical analysis, but that "something" is absolutely necessary for protection from scurvy. Another deficiency disease of perhaps even more importance is the beriberi of the Orient. The poorer people of China and Japan subsist almost entirely on rice and fish. In recent times it has been the custom in those countries as in ours to subject the

rice to a milling process which removes the outer coating of the rice kernel and gives it a much more pleasing appearance. Beriberi, until recently, was a very common and very fatal disease among them. Its cause was a mystery until a medical officer of the Japanese navy noted that in comparison with European sailors, who had few or no cases of beriberi, the Japanese were receiving much less protein. Much of the Japanese diet consisted of rice containing of course a large percentage of carbohydrates.

The medical officer, Takaki by name, recommended that this rice be substituted in part with foods richer in protein. An opportunity was soon presented to test out this diet. Two training ships were about to set out for a cruise of nine months over the same route. Upon Takaki's recommendation the diet for the sailors on one of these ships was changed so that it contained less rice and included as a source of the increased protein a fairly liberal supply of milk and meat. The sailors on this ship who had eaten the new ration developed no cases of beriberi, while on the other ship using the older ration more than fifty per cent of the sailors were taken down with the disease. Indeed Takaki had made a wonderful discovery and was promptly proclaimed a hero.

Beriberi's Cause and Cure

Naturally he believed that beriberi was caused by a protein deficiency in the diet. He was right in part, for the discovery that beriberi is a deficiency disease is due to him. As we will see, however, the deficiency is not due to proteins. The curtain will now go down for fifteen years and the scene shifts to the island of Java in the Dutch East Indies. A Dutch physician stationed there noticed one day that a flock of fowls in which he was interested were all taken sick with a disease that had

all the characteristics of beriberi in the human. On inquiry he found that an attendant a few days before had fed them some cooked polished rice from the hospital kitchen. Eijkman, for this was his name, then fed them some uncooked, unpolished rice and they quickly recovered. He followed this up with some feeding experiments and found that he could always induce polyneuritis, as he named the disease to distinguish it from beriberi of the human, by feeding fowls polished rice. He could restore them to health by feeding unpolished rice or even that part of the rice kernel that is rubbed off in milling. There was indeed something in the outer covering of the rice kernel that would cure polyneuritis and the lack of which would cause it. Dr. Eijkman was right on the brink of a discovery but he failed at the time to see the significance. He explained the phenomenon by the hypothesis that there is some sort of a poison in the rice kernel for which the outer covering is an antidote.

Work of Dr. Funk

Another period of years elapsed until Dr. Casimir Funk took up the problem and found that yeast contains a mysterious "something" with apparently the same properties as that which Dr. Eijkman found in rice polishings. To this mysterious "something" Funk gave the name "vitamine," and his hypothesis that a new unidentified food factor had been discovered is the view that exists today. To Dr. Funk then belongs the honor of the discovery of the first vitamine.

Space will not permit a review of the brilliant work of McCollum, Osborne and Mendel, which led to the discovery of the second vitamine. To date there have been three and possibly four vitamines or groups of vitamines discovered. To Dr. McCollum we are indebted for the names fat soluble A, water soluble B and water

soluble C. They are sometimes called the antirachitic, the antineuritic and the antiscorbutic vitamins respectively. It is generally believed that these vitamins are not single substances but rather groups of substances. Fat soluble A is found associated with certain fats as butter fat, egg yolk fat and the fats of the glandular organs. It is also found in the leafy vegetables. Water soluble B is much more widely distributed. Its principal source is the seeds of plants and eggs of fowls. It is very abundant in yeast. In the case of beans and peas it is distributed fairly evenly throughout the seed but in cereals it is concentrated in the germ. Patent flour contains but little of this vitamin. This is also the reason why it is missing in polished rice. The sources of vitamin C are vegetables such as cabbage, turnips, lettuce, etc., and such fruits as oranges, lemons and limes. It is also found in tomatoes and raspberries. Milk contains all three but it is not a particularly good source for vitamin C.

Function of Vitamins

Just how these vitamins function is not known. Some investigators believe that they act as stimulants. Others believe that they supply the body with something it is not able to manufacture. It is only guessing at best and one guess is perhaps as good as another. Vitamins A and B are absolutely necessary for growth or in fact for life itself. Young growing animals fed on a diet lacking in either of these vitamins not only cease to grow but die in a short time. Scurvy is prevented by the presence of vitamin C.

Since much of our food has been subjected to heat in its preparation, it is of interest to know the effect that heat has on the vitamins. Vitamins A and B have been found to be fairly resistant to the action of heat. It is doubtful if their efficiency is much if any impaired by the

ordinary temperatures of cooking. This is not true of vitamin C however. Its efficiency is destroyed when exposed to heat for even a short time. It is claimed, however, that vitamin C is not killed in some processes of canning and it has been shown to exist in powdered milk made by one of the modern processes.

Vitamins cannot be detected by any known chemical means. The only method we have today for studying them is by feeding animals. The three vitamins already discovered are probably not single vitamins but groups of two or more. Although but few years have elapsed since the discovery of vitamin B by Dr. Funk a tremendous amount of work has already been done in testing out various foods for them. Much remains to be done. No doubt there are many more vitamins of which we today know nothing. Perhaps before many years there will have been so many discovered that there will not be enough letters in the alphabet to apply to them. A new era in the science of nutrition began with the discovery of the vitamins.

(To be Continued)

Stung—with an Idea

G. H. Gale, writer for a bee paper, would not appear, on first thought, as one who ought to become very much enthused over the Toast for Breakfast Campaign. Yet the *American Bee Journal* for December, contains a splendid article. It shows that he has become badly stung by the toast idea's possibilities in creating more work for the bees.

We find it difficult to keep our file of the *JOURNAL* complete. Will you kindly arrange to send two copies to our address? They will be put to good use.

—THE CAMPBELL-SELL BAKING CO.,
Denver, Colo.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

Published by the
AMERICAN INSTITUTE OF BAKING
1135 Fullerton Ave., Chicago

Entered in the post-office at Chicago, Illinois, as second-class matter, under the act of August 24, 1912.

Price, Fifty Cents a Number; Five Dollars a Year.

DECEMBER 15, 1923

Hope Lies Ahead

Through every move that brings nearer together in the Christmas,—the spirit of service,—all who enter into the making of bread at any stage in its progress from farm to consumers' table.

"Humbug"

"BAH!" said Scrooge. "Humbug!" and the spirit of Christmas went into the mental waste basket of the leading character in Dickens' "Christmas Carol." "Bah!" said the non-progressive baker. "Humbug." And the idea of science and progress in the baking industry went into many mental waste baskets. But, just as the ghosts in Dickens' story brought a new vision to Scrooge and inspired in him real Christmas feeling, so some members of this industry, with a vision, have unflinchingly worked, until now we have an American Bakers Association recognized as unique in trade associations in many respects. No longer do we hear the scoffing reference to "the butcher, the baker and candlestick maker." Rather, the baker of today is recognized as supplying a definite service to humanity. Let us, therefore, in these days of Christmas joy, give thought to the fact that the American Bakers Association, like Christmas, is no "Humbug" and, while doing something for friends and relatives, do something also for the industry of which

we are a part, by obtaining one new member as a Christmas gift. Your governors will, with true Christmas happiness, say:—"God bless you, merry gentlemen, may nothing you dismay."

RAYMOND K. STRITZINGER,
President.

Together

WE HOPE every baker who reads the Christmas greetings from President Stritzinger will mark that item and pass his copy of BAKING TECHNOLOGY to some non-member friend to read. After all, organized bakers must be the great evangelists of the idea of coming together, to those of their friends and brothers who will not see.

This magazine exists to give wheat growers, bakers, millers, machine men, friends in the allied trades, and scientists who work on cereal problems or in sanitary service, the common fund of facts on which they can meet for service in co-operative effort.

We have not gone far. The trail still ahead is the long one. But looking backward—it is only ten years since officers of American Bakers Association duly voted that they had nothing in common with millers. Now the whole industry knows that bread baking is just one step in the progress of wheat from farm to consumer, and that wheat growers, millers, bakers, grocers, and consumers have enormous interests in common.

It is the hope of the Association that as it gathers strength in its own field it may work more closely with the headquarters of each and every other allied field, where strength from within is also being garnered through earnest work.

If farmers, for instance, knew the overhead and expenses of baking bread in these

post-war days they would not be decrying the bakers with foolish charges that they make 2 and 3 cents per loaf, but would be joining with them to promote intelligent merchandising and creating a market for wheatstuffs in every corner of the land where such a market can be fostered.

Unconquered

WITH bacteria our men of science have performed enormous feats of conquest, and in this service the Rockefeller Institute stands at the head of research institutions. Its president, George Edgar Vincent, attended the silver jubilee of the *Northwestern Miller*, at Minneapolis. He told the story of the conquest of wheat berries by the millers, and the conquest of the art of baking by the bakers. He told how William C. Edgar, editor of the *Northwestern Miller* for forty years, had brought to his service a dominating respect for religion, a love of art, a love of poetry, a love of sculpture, and a love of life which made this paper one of the outstanding factors of American life.

But as he spoke President Vincent bore home to one mind at least, an overwhelming sense of a field yet utterly unconquered. His sentences flashed like chain-lightning over the audience, caught up the crowd's emotions, heightened them, flashed them back, and elevated all present to a new level of comprehension of what wheat growing, milling, baking, merchandising, are all about. Yet the speed of delivery was so great, no device, human or mechanical, could impinge his words on paper. They will live in the minds of those who heard them, but our wish to reproduce them in this magazine is baffled. Here is a task for someone: who will speed up stenography or dictographs until the conquest of Vincent's speech is accomplished?

Next Up?

AFTER the toast campaign what next in organized effort between industries? On all sides it was recognized that the business of promoting the use of toast by making toasters available in all electrically wired homes, and putting recipes for toast in every housewife's hands, was only a preliminary. It served to bring around a common council table leaders of the baking industry, of dairying, of electric current production, of electrical manufacturers, of jam, butter, meat, egg, margarin, coffee and other producers, and even of wheat farmers.

Now that they have met and looked upon the world with one common purpose they cannot fail to carry forward the new spirit of good will and unity. What task next befits their power? Sweetgoods need a new introduction to the breakfast table and greater accessibility to the home purchaser.

After Eighty

WHAT greater honor could come to a man within his own lifetime than to see a great new industry built upon an invention he has contributed to the world? Dr. Stephen Moulton Babcock shares such an honor with Gustav De Laval. Except for the work of these two men, farm women would still be churning butter on the farm and skimming milk pans in damp cellars. They freed millions of women from one of the fundamental farm drudgeries, just as modern baking machines and modern baking service is freeing them from another fundamental drudgery. Dr. Babcock, it happens, is still alive. He celebrated his eightieth birthday on Oct. 22 last, at his home in Madison, Wis. There he was greeted by thousands of friends, who hailed him for his services to his community, his nation, and the whole world.

Toast, with every spread



*"Steaming Coffee, Hot Toast
—for breakfast"*



*"Ham or Bacon
Sandwiches—Toasted,
a delicious lunch"*



*"Cheese on Toast
and Cinnamon Toast"—for tea*



*"Toast and Jam
—the kiddies' choice"*



*"Milk and Toast
—Health Twins"*



*"Good Butter
makes
Toast Better"*



*"Toast
Electrically"*

Have your toaster ready for use at all times

All over the United States manufacturers of foods are advertising their products in combination with toast. This advertisement gives some of the slogans which the various industries are using. Women's Clubs everywhere are teaching the food value of toast combinations in homes and schools. Manufacturers, retailers, as well as every individual, are invited to co-operate in this widespread movement which has as its aims, proper nourishment in diet as well as increased consumption of wheat, thereby building up the nation's health and stabilizing the wheat market for the farmer.

WHEAT COUNCIL OF THE UNITED STATES

An Advertisement Adapted to a Toast Campaign in Any City

Panary Fermentation

How Biochemical Changes During the Process Affect Bread Quality

By C. BREWSTER MORISON*
Of the American Institute of Baking

THE process of bread-making may be divided conveniently into three principal stages which are well defined in plant operation. These are, in sequence, the mixing of the raw materials, the fermentation of the resulting dough, and baking. In commercial practice the fermentation period is generally understood to be the total time which has elapsed from the completion of mixing until the dough is ready for scaling or dividing. Actually, however, fermentation changes are initiated during mixing, and continue through the subsequent mechanical operations of making up, receiving an additional impetus from the high temperature of the final rising, or proof, and again at the beginning of baking.

The successful control of fermentation, especially in relation to the determination of the time required for the proper development of the dough, so that it can be made up, given the final proof, and baked is perhaps the outstanding problem of the bread-making process. It involves not only the effective coördination of practically all plant operative conditions from the mixer to the oven, but fundamental considerations relative to the flour, particularly its strength, the properties and composition of the many other ingredients used in bread, and their adjustment or arrangement in formulas. It is thus a problem complicated by a number of variables in any given set of conditions, which include shop operative factors, character of flour and raw materi-

als, and the inherent complexity of the physical and biochemical changes which take place in heterogeneous systems such as a bread dough.

The essential purpose of panary fermentation, expressed in rather general terms, is the effective aeration of dough by the uniform dispersion of a gas throughout the system, which must be occluded and retained by the gluten, so that a well-risen loaf of bread will result on baking, of required volume, grain, texture, taste, flavor and certain other desirable characteristics. This process must be so conducted that no injury or weakening is done to the colloidal or physical properties of the wheat protein or gluten that determine the capacity for what is commonly termed "gas retention" in the literature of flour strength.

Aeration is primarily accomplished by the use of various leavening agents from biological or chemical sources, of which culture yeast is now the most important. Compressed yeast produced from pure culture strains of the organism physiologically adapted to gas production in the complex environment of dough has practically supplanted the old methods using natural leavens, barm, ferments, and brewers' yeasts, except in certain instances where special types of bread are required; but even here biological culture materials are coming into use, such as the well-known salt-rising ferment of Kohman and the recent "sauerteig" culture of Beccard, for the fermentation of sour rye doughs.

Chemical methods of aeration, such as carbon dioxide under pressure, or a saturated solution of this gas in water, have

*In a paper read at a meeting of the American Chemical Society at Milwaukee. Reprinted by permission of the *Journal of Industrial and Engineering Chemistry*.

now little more than historical interest, and chemically reacting compounds which evolve gas in the presence of moisture or heat find their chief application in biscuit and cracker doughs, cake mixes, and self-rising flours. In American bakery practice bread generally refers to the yeast-risen product.

The history of yeast as a leavening agent is of fascinating interest, but cannot be reviewed here. Malouin, who wrote the first book of any value on baking in the eighteenth century, commented enthusiastically upon the introduction of yeast into bread-making, thought at that time the varieties used were chiefly impure brewers' yeast. He recognized it at that time as epoch-making in the history of the baker's art. The classical researches of Pasteur, Hansen, and Lindtner, which were to come later, on pure culture yeasts for the fermentation industries have very probably been the most significant scientific influence on the advancement of baking. This statement can readily be appreciated if we imagine what might happen if culture yeast were eliminated from modern commercial practice. Perhaps the future may bring forth synthetic catalysts which will displace yeast. This is obviously a matter of speculation, though of considerable interest to the physical chemist.

The general purpose of panary fermentation has been previously indicated and reference made to the complicated nature of the problem. The remainder of this discussion will be confined to a review of some of the biochemical changes that take place, which appear to be of suggestive interest.

Biochemical Changes

The fermentation of a bread dough is characterized in its general aspects as a complex phenomenon which may be largely attributed to the presence of enzymes associated, not only with the physiological ac-

tivities of living cells, yeast, and bacteria, but with the flour and other products from biological sources. The typical biochemical changes involved are of the general nature of reactions catalyzed by enzymes, of which the fermentation of hexose sugars by Büchner's zymase, a veritable battery of enzymes, is the most prominent. There appears to be good evidence that the fermentation of sugar by living yeast cells is a typical enzyme reaction. Other changes are the hydrolysis of the disaccharide sugars, sucrose, and maltose, by yeast sucrase and maltase, with the production of the hexose sugars, glucose, and fructose, and that of starch by the diastatic enzymes of wheat flour and other materials such as malt extract, with the production of maltose which may be converted into available glucose.

Some hydrolysis of the protein constituents of doughs, particularly the gluten of wheat flour, probably takes place, though there is little information in the literature regarding it, either as to the extent of such changes, the determining factors involved, or to the sources of the enzymes. This is a problem of immediate interest in connection with fermentation control, particularly in relation to the gas retention properties and coagulation of the gluten, which should include a bacteriological study of the flour and other sources of bacteria.

Effect of Carbohydrates

The carbohydrate materials used in bread formulas, either initially or subsequently available for alcoholic fermentation, are rather extensive. Cane sugar is generally used in most bread formulas in this country, to a greater extent than elsewhere. Other familiar materials are sweetened condensed milk, malt extracts, sirups, and various hydrolyzed products of starch, among which is a dried product of recent interest containing over 90 per cent of reducing sugars as dextrose or glucose.



Give Us This Day Our Daily Bread

by the Bread of Life Committee of the Diocese of the Holy Trinity, New York

The amount of sugar initially contributed by the flour is comparatively insignificant. Subsequently, as fermentation proceeds, the amount of sugar available from the flour depends largely either upon its own diastatic power or upon the presence of active diastases from other enzyme-bearing materials such as malt extract. The colloidal condition of the starch is probably of some importance here. The importance of the diastatic content and activity of wheat flour in this connection has been recently pointed out by Rumsey, especially in regard to the importance of sugar production in the later stages of fermentation, particularly in proofing, and during the first few minutes of exposure to the heat of the oven, while the effects of the addition of diastatic products have been investigated by Collatz, who has noted the desirable effects of supplementing the diastatic content in relation to gas production with certain types of flours.

Effect of Temperature

The influence of temperature on fermentation is well recognized in commercial practice as one of the requirements of successful bread-making.

The temperature coefficient of alcoholic fermentation by living yeast cells has been shown by Slator to be of the same order as for many chemical reactions, though varying considerably, an increase in temperature corresponding with a diminution of the coefficient. Aberson's results, $K_t + 10/K_t = 2.72$, which represents the mean coefficient for 10 degrees between 12° and 33° C., agree well with Slator's observations.

Gas production in the fermentation of doughs, as influenced by temperature under various conditions, has been investigated ever since there was any scientific interest in the subject, and considerable study has also been made of the optimum tempera-

ture for various enzymic hydrolyses, especially of the diastases.

In commercial practice straight doughs are usually set at about 26° to 27° C. Dough rooms are maintained at about 27.80° C. The temperature of the proof is considerably higher—32° to 37° C., for example—which greatly increases bacterial, yeast, and enzymic activity. On baking at the usual oven temperature, 230° to 248° C., the center of an 18-ounce dough may reach a temperature of over 63° C. in about 15 minutes. The optimum temperature for diastatic activity appears to be about 63° to 65° C. Collatz has recently found an optimum of 65° C. for malt flour. The presence of bacteria, such as the butyric acid group, which may produce undesirable changes, has received considerable attention in the literature. It does not seem very probable that, with the usual temperature employed and the increased hydrogen-ion concentration which develops during proofing, any appreciably injurious effects will occur from these sources.

Effect of H-Ion Concentration

The influence of the hydrogen-ion concentration on the fermentation of doughs has been a subject of much interest in recent years. This has been due primarily, no doubt, to the more general recognition of the importance of the hydrogen-ion concentration in relation to chemical reactions and biochemical phenomena generally, but more particularly in baking to the inspiration from the well-known investigation of Jessen-Hansen on the baking value of wheat flour. He stated in this paper that "for the dough of any wheat flour, there exists a determined concentration of hydrogen ions with which the bread produced from this flour will be the most successful, and this concentration is greater than that which is found in a dough made from the flour in question freshly milled and pre-

pared with pure distilled water or fresh milk. This optimum concentration corresponds approximately to the exponent of the hydrogen ion $\text{pH} = 5.0$; and that the hydrogen-ion concentration was a little higher for choice flours, and slightly lower for inferior flours, and that the different artificial methods used for increasing the baking qualities of inferior flours are of no value other than increasing the hydrogen-ion concentration of the dough." While the acidity of the dough had long been recognized as of great importance in bread-making, consideration regarding it had been confined before Jessen-Hansen to the gross effects of titrable acidity.

Since 1911, however, the effect of acidity in terms of the hydrogen-ion concentration generally determined by electrometric methods has led to a better understanding of the phenomena involved and the limitations of our present knowledge of its influence on the question of the proper length of the fermentation period with various kinds of flour and other components of bread doughs. Some investigators have apparently considered that, if a bread dough is fermented to about the hydrogen-ion concentration of $10^{-5} N$ or $\text{pH} = 5.0$, the problem is solved, and the time elapsed from the original hydrogen-ion concentration to the development of this optimum is the correct period of fermentation. Unfortunately, however, this does not always follow. Bailey and Sherwood have recently stated, after a long and painstaking investigation in which they followed the changes in hydrogen concentration as pH from the mixing of the dough to the baked bread in a number of large commercial doughs under plant conditions, that they "do not feel that the control of the hydrogen-ion concentration in dough fermentation necessarily implies entire control in practical results."

Their summary of the significance of the

hydrogen-ion concentration is of much interest. In their opinion the chief reasons are that the isoelectric point of the gluten is at $\text{pH} = 5.0$, yeast fermentation apparently reaches a maximum at $\text{pH} = 5.0$, flour and malt diastases have their optimum activity, other things being equal, at $\text{pH} = 5.0$, and rope-producing organisms are apparently almost inactivated and their activities reduced in mediums more acid than $\text{pH} = 5.0$. Since patent flour doughs are much less than $\text{pH} = 5.0$, it follows, as far as the foregoing phenomena are concerned, that they all tend to approach an optimum as the dough progressively increases toward $\text{pH} = 5.0$. "Whether some of the phenomena, such as proteolysis, are effected in the same direction has not been determined as yet." Bailey and Sherwood's work emphasizes that, in the estimation of the probable rate of fermentation of bread doughs for their optimum hydrogen-ion concentration, there are a number of variables which must be taken into account, such as grade of the flour, consistency of the dough, temperature, weight of the dough batch, and the influence of materials, the composition and properties of which may influence the rate and direction of the change.

An important point is made in reference to calculating the period of fermentation from initial hydrogen-ion concentration of the dough—that this should be done in relation to the grade of the flour, or that doughs made with lower grades be deliberately acidified at the outset. The addition of acids and acid-reacting or producing materials is of much interest in this connection.

Additions of organic acids such as lactic acid to bread doughs under certain conditions of temperature and proper adjustment of the formula have been found to have a desirable effect in rapidly bringing

the dough to the optimum pH for baking.

Another important influence of the optimum hydrogen-ion concentration of bread doughs is in suppressing the activities of certain bacteria other than those of the mesenteric group responsible for rope.

Other Considerations

There are many other aspects of panary fermentation that might be reviewed which are concerned with the effects of various agents, such as free oxygen, electrolytes, fat and other compounds, on yeast and enzyme action, as well as the interrelation of fermentation changes with the physical properties of the gluten for the retention of the gas. The study of lactic acid bacteria suitable for introduction into the dough batch for increasing the hydrogen-ion concentration is now being the subject of considerable investigation. As the tendency in baking has been to shorten the fermentation period ever since it began to adapt itself to large-scale production demands, the future probably will bring forth improvements in this direction both from the mechanical and biochemical sides. The subject in its entirety is such a broad one that many points of interest have necessarily remained unmentioned. If the impression has been created that panary fermentation offers a broad field of study for the chemist and biologist, it will have served its purpose.

Dididi and Pipidi

SCIENTISTS usually defend the practice of saying "the dough has a pH of 5," when they mean "it is sour," by declaring the language of science has to be one of greater exactness than laymen can appreciate.

But even the scientist has to come down to something like lay levels sometimes, as, for instance, when a chemist attempted to

telegraph the names of two accelerators used in rubber manufacture.

"Can't get dididi, am sending pipidi," he wired, and when accused by the telegraph operator of using code words where they were not permitted the chemist duly produced the full and unabridged originals. They were dimethylammoniumdimethyldithiocarbamate and piperidinepiperidyldithiocarbamate. Even the *Journal of Industrial and Engineering Chemistry* sanctions the use of the nicknames in this case.

Bakery Thermometers

IF YOU happen to have more than one thermometer on your premises put them in water and note the result. Some years ago I had an experience that caused me to examine this point, and I gathered together all the thermometers in the place to the number of five. These were put into a measure containing warm water, and *not one* registered the same temperature; there was indeed five degrees between the maximum and minimum registrations. The baker ought to have a thermometer registering correctly and quickly, and I believe in the meantime that not ten bakers in a hundred have such a thermometer. So much depends upon temperature of dough that this matter cannot be ignored.

—OBSERVER, in *The National Association Review*, London.

Since taking advantage of your service department's scores and criticisms our bread has steadily improved, and with your further assistance we hope soon to reach the 100 per cent mark. What change would you suggest for improving the taste? How can we improve the flavor? Your suggestions and criticisms are always greatly appreciated.

—From a letter of an Indiana Baker.

Flour as a Colloid System

Physical Properties of Gluten Are Now Believed to Play Large Role in Baking Satisfactory Bread

By DR. ROSS AIKEN GORTNER*

Of the University of Minnesota

WHEAT flour, the only one of the cereal flours which is adapted to the manufacture of yeast-leavened bread, owes its desirable properties to the nature of the proteins of the wheat. These proteins have been extensively studied and comprise a prolamine *gliadin*, a glutelin *glutenin*, an albumin *leucosin*, a globulin, and a protease.

The gliadin and glutenin are present in the dough in a rather intimate physical or physico-chemical mixture which is known as the gluten. Whether or not gluten is formed in the process of dough manufacture or whether it already exists in the endosperm of the wheat berry is still an open question.

The gluten plays its rôle in bread manufacture in that it absorbs water and forms an elastic gel, which stretches under the tension of the carbon dioxide produced by yeast fermentation and thus "raises" the loaf. The tenacity with which gluten particle adheres to gluten particle varies widely from flour to flour. Those flours which have a high ratio of carbon dioxide production to carbon dioxide diffusing through the gluten are desirable for bread-making purposes, and are known as "strong" flours. Those flours that form doughs which fail to retain a large proportion of the carbon dioxide are known as "weak" flours, and are more suited to the manufacture of pastry and crackers than to yeast-leavened bread.

Many investigators have concerned themselves with a study of the factors which may be involved in flour strength, but it has been only recently that the newer theories and methods of colloid chemistry have been ap-

plied. These studies give promise of assisting materially in a solution of the problem.²

The work referred to has convinced the writer that the physical properties of the gluten are, in many instances at least, the determining factor as to whether or not a given lot of flour will produce a satisfactory loaf of bread. It would appear that the physical properties of the gluten are in a large measure determined at the time the wheat proteins are laid down in the endosperm of the wheat berry, with the result that the strong flours are strong, not because they differ in acid or salt content from weak flours, but because the gluten is capable of forming a more tenacious gel than is the gluten from a weak flour. The question as to why glutes differ in tenacity is still unsolved. Nevertheless, the fact remains that such differences do occur. It would appear as if the flour strength problem were closely allied to the rubber problem. Why does rubber produced in different localities and by different methods differ so enormously in tensile strength and in value? It appears probable that rubber is a polymer of isoprene. It may be that chemically the rubbers are indistinguishable from each other, but this does not preclude a wide difference in physical properties. A solution of the rubber problem may solve the strong and weak flour question, and perhaps the cereal chemist may solve the problems vexing the rubber manufacturer. It is a long cry from bread to automobile tires; nevertheless, in this problem of tensile strength they meet on common ground.

In an investigation having for its object the question as to which of the proteins of wheat flour was responsible for the variation in the physical properties of the gluten, it was found³ that the alcohol-soluble protein apparently showed uniform physico-chemical properties in both strong and weak flour; the glutenin, however, differed widely from flour to flour in its physico-chemical properties. It appears, therefore, that the question of flour strength is dependent primarily on the physical properties of the glutenin. Viscosity measurements on flour-in-water suspensions brought to a pH of 3.0 by the addition of lactic acid have been found to serve admirably as a means of evaluating gluten quality, and it has been found possible by such measurements to give for the first time a numerical value to gluten quality. Inasmuch as viscosity is such an important property to the emulsoid colloids, it appears probable that colloidal properties of the gluten gel are the determining factors in flour strength. It is possible to destroy the desirable baking qualities of wheat flours by altering the physical properties of the gluten gel. For example, doughing up a flour with 70 per cent alcohol and immediately evaporating the alcohol at room temperature will ruin a wheat flour for bread-making. On the other hand, such treatment is without effect upon rye flour. Both wheat and rye flour contain the same prolamine gliadin, but rye flour contains no glutenin, and these experiments are regarded as additional evidence that it is the physico-chemical properties of the protein glutenin which cause the variation in the baking qualities of wheat flour. (Variations in baking quality may be caused by factors other than gluten quality. The discussion in this paper is limited to gluten quality and is not intended to include factors influencing yeast activity or variations due to different amounts of gluten.)

Colloid phenomena are likewise concerned in the baking processes and in the baked loaf. During the baking process the proteins are heat-coagulated, causing changes in their water-holding capacity. A part of the starch grains are ruptured, causing the gelatinized starch to absorb moisture, the net result of such changes being that the consistency of the dough is altered to the rather firm texture of the baked loaf. When such a loaf is stored at ordinary temperature it becomes "stale," the stale condition being characterized by a crumbly texture and a feeling of dryness. Apparently, the staling of bread is not due primarily to a loss of water from the loaf, but rather to changes in the protein-starch gel. Several workers have produced evidence that the staling of bread is caused by metastable gelatinized starch reverting to a more insoluble form, with coincident changes in the colloidal properties of the loaf, such as differential syneresis and imbibition in different portions of the loaf.

*Read at a meeting of the American Chemical Society at Milwaukee Sept. 10-14 and reprinted by permission from the *Journal of Industrial and Engineering Chemistry*.

¹Abstract of paper. The complete paper expanded to cover a somewhat broader field will appear as a chapter in a book on colloid chemistry which is to be issued under the editorship of Jerome Alexander.

²For a review of the literature dealing with flour strength and the original papers on the relation of flour strength to colloidal properties, see *J. Agr. Research*, 13, 389 (1918); *J. Phys. Chem.*, 26, 101 (1922); 27, 481, 567, 674, 771, in press (1923).

³*J. Phys. Chem.*, 27, 674 (1923).

There is need for us to take a broader view of the association work and the way this work is reflected back in benefits to our own business. The association work can never be well done unless bakers as a whole take an interest in it.

—WILLIAM FISCH of Atlanta, Ga., in a letter to the National Association's office.

No man can do without the American Bakers Association and stay in the baking business.

—W. MULLER, Pres. Muskegon Baking Co.

The Chemist's Bakery Role

How It Has Enlarged Through His Increasing Knowledge of Bakery Craftsmanship

By WASHINGTON PLATT

IN SOME of the oldest Egyptian tombs have been found models of bakeries which are extraordinarily like the smaller bakeries in present use. The troughs for mixing the dough, the benches for forming it into loaves, and even the ovens are strikingly similar to some of those still in use at the present time. We find the baking industry mentioned in very ancient writings.

Baking made surprisingly little progress from century to century. A baker of the year 1000 A. D. would probably have been very much at home in a bakeshop of the time of the American Revolution. The baker was not only a craftsman but also an artist. The quality of his products depended upon the feel of the dough at different stages of the process and upon his own skill in handling it.

Baking was moreover regarded as a good deal of a mystery. The process of bread fermentation was so little understood and so hard to regulate that expert bakers had no trouble in throwing an air of mystery about their art and keeping their methods secret.

In all of this, science had little or no part. The chemist was faced at the outset with fundamental difficulties. In the first place a knowledge of the craft and skill in handling the dough was necessary and no insight into chemistry could enable a chemist to make good bread before he had required the proper mechanical skill.

In the second place the chemistry of baking is extraordinarily complicated and difficult. Flour being a mixture of starch, several proteins, and many inorganic salts is bad enough by itself, but this mixture

was made worse by the addition of sugar, shortening, sodium chloride, water and in some cases yeast.

To make a bad matter worse the action of many of the controlling factors in baking depends not only upon the chemical composition of the compounds but also upon their colloidal conditions. Is it any wonder that the chemist found it very difficult to prove his worth to the baker?

Thirty years ago some little progress had been made in regard to the analysis of the raw materials used in baking, but even this was of comparatively little value to the baker. Even until very recent times it was a fact that an experienced flour buyer could tell more that was of real value about a flour in five minutes than a chemist in as many days. Given a series of flours a chemist could tell which one contained the most ash or nitrogen but he could not tell which one would make the biggest loaf of bread or which one would make the most delicate cake. Given a series of fats he could tell the melting point and iodine number but he could not tell which fat would give the lightest cake or which one would have the greatest shortening power per pound.

There was no industry in which the chemist without factory experience was more likely to make an ass of himself than in the baking industry and many chemists did this very thing to the great delight of the "practical men" in the industry.

Not Deterred by Blunders

Chemists were not deterred by these tremendous handicaps from tackling this question. A large number of very able chemists have boldly devoted their time to

the problems of the baking industry. What is the result?

All of the largest bread, biscuit and cake bakeries maintain laboratories of their own. These not only make analyses of the raw materials; but also perform research work along the lines of improving the finished product of eliminating waste. Problems formerly turned over to the foreman are now frequently referred to the chemical laboratory. New products offered to the baker are sent to the chemist for his recommendation before being tried out in the factory.

Purchasing agents frequently have the chemist at their elbow when talking to a salesman representing a new product. This has a sobering effect on the salesman, compels him to confine himself to facts and prevents those flights of imagination regarding the wonders of his new material. Important questions concerning the choice of raw materials or difficulties in production are being more and more turned over to the chemical department for solution.

In one of the most difficult of all industries the chemist has made good.

Research chemists at the universities working on baking chemistry have also made real progress which has had an important influence on the industry. Ideas of bread fermentation which had persisted among bakers for thousands of years were changed by the chemists at the Mellen Institute who perfected the use of inorganic

yeast foods by which millions of dollars are now saved annually.

Chemists connected with industries manufacturing raw materials which bakers use have likewise made practical contributions to the chemistry of baking. Among these may be mentioned especially the Yeast and Milk industries.

Independent biscuit and cracker manufacturers maintain a joint research laboratory for the investigation of their problems and the president of their Association

has recently founded a Research Fellowship at the University of Minnesota to work on the problem of the fermentation of cracker doughs. The American Bakers Association now supports the American Institute of Baking. This Institute is housed in a fine three story double brick building with a large annex. This building is completely equipped as a chemical laboratory and scientific school of baking. These latter institutions are

Eyes to See And What They See in Dough

To the excellent baking craftsman, dough was a mysterious thing that had to "feel right to the touch" before it would behave right in the oven. The chemist looks at the dough in a different light. He sees a mixture of starch, proteins, inorganic salts, sugar, shortening, sodium chloride, water and yeast.

How chemists have gradually learned craftsmanship while contributing Science is here told by one of them. Hard service with an oven peel gave Washington Platt as much knowledge as his service with test tube and formulas, and his combined work lends interest to what he here sets forth.

all supported by practical men who have found the money thus spent a very good investment.

The Work of Carver

If any baker thinks there is no need for alertness in watching the welfare of baked products, from every standpoint—merchandising to cereal research—let him take note of a few newly discovered facts about two kindred products.

Prof. Geo. W. Carver took up the in-

tensive study of peanuts, yams, and pecans. From peanuts he developed 116 products, from sweet potatoes 165, and from pecans 98. Industrial leaders testify that the contributions of this scientist, who happens to be colored and the son of a slave, mount to millions of dollars in value. Yet he refused all offers from industrial concerns and continues in his position at the Tuskegee Institute.

It might enlighten many of us to find out how many of these newly developed products will help make bread palatable—as for instance peanut butter in sandwiches. Like the combinations of hard chocolate and ice cream, these products of the research laboratory are capable often of being intensively merchandised with revolutionary effects on industries that at first considered them to be mere byproducts.

Seasonable Extras

DOES it pay the baker to take note of the seasonal hungers of his friends and customers? You know how it is with Harold Teen, most popular hero of the newspaper funny strips. All the world that is under twenty, loves some Movie Hero, so Harold is started off as an impressionable youth into Movieland. He meets the heroes and heroines of our young folks, so they are glad to see how he gets along.

When Christmas comes everybody thinks of home and home folks. So Harold does also, and his adventures near Christmas have to do with his trip back to the home roof. Youth's hunger for adventure and for love all find expression in this comic strip. We have to vote that its creator knows human psychology and the human heart.

Gordon Smith, in the far south, makes a gesture to his clientele at Christmas, that appeals to the hunger that comes but once a year. It is in the form of a fruit cake so

excellent that its fame is as broad as the nation. In the east, several bakers do the same thing. In Tacoma, Will Matthaei puts the best he has, both in ingredients and decorative wrappings into a Christmas cake for Christmas celebrants.

In the case of Matthaei a letter came to us from a woman whose Christmas was made more cheerful by this special gesture for the baking industry. What she wrote has, perhaps, a suggestion for all bakers in it. It follows:

"Just a word to tell you how good the bread looked in its holiday wrappings, and what a pleasant surprise it was to find something seasonable in the old grocery basket.

"The beautifully decorated bread wrapping suggested fruit cake and I bought three—one for use and two for gifts. Some friends from Seattle said the cake tasted as good as the box it came in looked, which was saying a great deal. Best wishes for your success in 1924.

"MRS. O. C. NELSON."

Every baker who reaches out into the lives and special hungers of his people can merit letters like that. They bespeak a goodwill that pays higher dividends than ever money can.

Not Sanitary

A BAKER who hasn't yet learned the lesson that the use of premiums provokes other bakers to outdoing him in premiums, and in the end brings only wrinkles and disaster to the premium devotee, decided to put half dollar pieces in his bread.

The baker did not fall afoul of the law. It was found there was no law to keep money out of dough. But he did fall afoul of James Foust, Director of the Bureau of Foods. Mr. Foust happens to be keenly alert to the role bacteria play in modern life

and the science of sanitation that keeps our bodies free from them.

"May I ask you to discontinue this practice," Director Foust wrote to the baker, "as it is unsanitary and unhealthful, if not dangerous." Thus one more premium plan went to the limbo in favor of a plan to put half dollars in dough in the form of their worth in better ingredients and more appealing quality.

Concerning Some Titles

HAS an industry ever existed which has driven home to the heads of nations its important rôle in the affairs of man so completely as has the dairy industry?

The current number of the *Creamery and Milk Plant Monthly* of which H. E. O. Heineman is editor, contains these titles over leading articles:

"President Coolidge's address to the members of the World's Dairy Congress."

"Remarks of Charles E. Hughes, Secretary of State, to the World's Dairy Congress."

"Address of Herbert Hoover, Secretary of Commerce, before the World's Dairy Congress."

"How Research Aids the Ice Cream Industry."

When we stop to consider that one of the most expensive wastes in American life today is the waste of whey and skim milk that could be used in bread for the people's benefit, we surely see that there is here abundant opportunity for uprearing the baking industry as the milk industry has been upreared in national esteem, and then co-relating them to the fullest possible degree.

I find the JOURNAL OF BAKING TECHNOLOGY a very good magazine—one to be studied, not merely read.

—M. C. Ross, Lindsborg, Kansas.

Wanted—Help

As the scientist makes his way into industry he becomes the target for humor makers, along with all other groups that help in the making of bread. Now comes a pleasant wag on a newspaper column. He wants the chemists to discover a new method of increasing digestibility, and he voices his plaint in this plea:

"Agricultural chemistry has advanced by leaps and bounds. Libraries are filled with books on calories and vitamins. But won't somebody please evolve a digestible bread label? No Ph. D. as yet has tackled it."

In Transition

We hear a great deal of talk these days about the baking business being in a transition stage, meaning, of course, that the making of baked goods is passing from the hands of the women in the homes to the professional baker, just as the weaving of cloth, the making of shoes and many other the sooner the transition is completed the occupations changed. It is quite true, and better for the baker. But there is this difference that is going to delay the process. Bakery products are to be eaten and people generally are much more fastidious about the things they eat than they are about the things they wear or use. **That is the chief reason why everyone is stressing quality products.** It not only pays the individual baker to make quality products but it helps the transition.

—An editorial in *The Baker and Confectioner*, Toronto.

I am very glad to note the increasing membership of the National association. We always speak of the Institute with pride when opportunity arises.

—The G. B. Lewis Co., Watertown, Wis.

Improving Quality in Malt

How the High Diastatic Factor of Earlier Practice Was Found to Be an Evil and Was Eliminated

By F. A. COLLATZ

UP IN Canada, in certain sections, they no longer bother with oil or coal in the home. It's "hydro" that does the work. A little switch on a kitchen range controls the cooking.

Long before there was a "toast and toaster" move in America a visitor at the home of David Tod, past president of the Canadian Bakers Association, was rather shocked at the facilities for cooking dinner. Mrs. Tod had attended a convention at Toronto, with her husband, and had invited a guest home, with the explanation that it was the maid's day out and she would have to get the dinner after arrival home. The home was at Oshawa, thirty-odd miles away.

A motor ride over to that town from Toronto seemed hardly over with, when Mrs. Tod announced dinner. It consisted of coffee in an electric percolator, and heap-
ing dishes of toast—and fried bacon. About the toast there was one peculiarity, as compared to the previous experience of the American visitor.

No two pieces of toast seemed from the same kind of a loaf. There was whole wheat toast, white bread toast, malt bread toast, soft bun toast, and sweet-roll toast. And all of these breads seemed delicious, as toasted and served with bacon. The visitor was surprised to find that each kind of toast seemed like a new product and that a delightful dinner resulted from the varied assortment plus crisp bacon, toasted cheese, and preserves.

In America the tendency to offer more and more varieties of bread seems to be growing. Cheap hydro is coming over the Far West and in New York state. Is there

a lesson for all of us in the multiplicity of appetite appeals that can be satisfied with a multiplicity of toasted breads?

The article printed below deals with one kind of bread. Its author recently won the degree of Ph.D. from the University of Minnesota because of research into "flour strength as influenced by the addition of diastatic ferments." Here you find the finished scholar in action, for he points out that we are only at the beginning of what is to be known about ferments and their behavior in dough. Here you see, again, how one kind of malt was found to work evil in dough, in that it too speedily broke down the gluten and worked against volume. You will see how this evil was detected at the source, that source removed, and the malt loaf put upon the route of a greater success. Thus it is that science comes into our industry and gives this magazine much that it is happy to record.

The ever increasing consumption of bakers' bread is, in itself, the best recommendation that the baker could possibly have, and shows quite clearly that he is baking better bread than in former years. The need for better bakers' bread was long recognized by the farsighted leaders in the baking industry, and today mainly through their efforts we are on the high road to the perfect loaf of bread. This change from an indifferent loaf of bread to our present quality loaf was not an overnight change, but came very slowly and with much hard work on the part of the bakers and their allied tradesmen.

In making a quality loaf of bread, the

ingredients which go to make up the dough are of the first and greatest importance, and it is the purpose of this article to bring before you some characteristics in regard to one of these ingredients. This particular ingredient is malt extract, which is being used in ever-increasing quantities by the baking industry of today.

The Pioneer Period

Malt extract was originally brought into this country with the idea of giving a different flavor to bread. The characteristic flavor and odor imparted to bread by the addition of malt extract to the dough is well known by the baker and needs no elaboration. There are, however, other very important characteristics of malt extract which have their effect in the dough and in the finished product. Let me take them in order.

First, malt extract is an aid to fermentation. This aid to fermentation is due to the chemical composition of the malt extract—first, maltose sugar which is more readily fermented by yeast than any other sugar; second, protein—which, in its soluble form activates the fermenting powers of yeast still further; third, its mineral salts which are a very necessary adjunct to the vital power of the yeast cell; fourth, the physical effect on the gluten of the wheat flour, which will be discussed later on in the paper. The first three properties show malt extract to be ideal for fermentation purposes, and have a marked effect upon the rate of fermentation, which is measured by the amount of gas evolved in a certain length of time. Of course, the rate of fermentation varies between different extracts and is dependent upon the maltose content, but malt always ferments faster and gives off a larger amount of gas in a given period of time, than does a like weight of cane sugar. This explains why doughs made with malt extract come faster than doughs made with a like

amount of sugar. This shortening of the fermentation period, matures the gluten as usual, and is a net saving in overhead; thus a faster fermentation is a desirable thing in the shop.

The disposal of stale bread has, for many years, been a continual source of worry and financial loss to the baker. We do not wish to claim that malt extract is a panacea for this evil, but we do know that bread made with sufficient quantities of malt extract remains fresher and more palatable for a longer period of time than one made with a like quantity of cane sugar.

Mystery of Staling

Staling of bread is still somewhat of a mystery, but we believe there are two facts connected with staling of bread; one is that there is a larger amount of soluble material in the crumb in a loaf of bread baked with malt extract than in one baked with cane sugar. This difference in soluble material is proportional to the relative amounts of malt extract and cane sugar used. Second, by the use of malt extract, the loss of moisture is decreased, due to the hygroscopic nature of maltose sugar. The difference between a loaf of bread made with sugar and a loaf of bread baked with malt extract becomes very noticeable to the consumer after the bread is thirty hours old.

The question of nutrition has become of vital interest to the manufacturers of food products, and this is particularly true in that most important food,—bread. By the addition of malt extract to the dough we are increasing the nutritional value of our bread today. Besides the maltose sugar, a part of which is left in the finished loaf, we are adding valuable proteins and amino acids, which are readily assimilated into the human system, and we are also adding mineral salts and those important biological substances called vitamins. We have

found, through numerous feeding experiments, conducted in our laboratory, that the nutritional value of bread is increased to a great extent by the addition of malt extract to the dough.

All of these characteristics of malt extract have the effect of producing a quality loaf of bread. Due to its chemical effect on fermentation and its physical effect on the constituents of the flour it helps to produce a loaf of good volume, good bloom, fine grain and velvety texture.

Protease and Gluten

When malt extracts were first put on the market, a high diastatic malt extract was believed to be the best, in that the diastase converted the broken starch cells of the flour into maltose, during the process of fermentation, and this supplied the yeast with a constant amount of maltose. By using a small amount of extract (diastatic) a considerable amount of sugar was formed in the dough which replaced a good deal of cane sugar. This was a good way of cutting down the sugar bill of the baker, which in turn cut down on the cost of production. High diastatic malt, however, is a dangerous material for the baking of bread, because not only does this diastatic malt contain diastase which converts starch into sugar, but it also contains an enzyme, known as *Protease*, which breaks down the gluten with great speed. Now, gluten is the most important protein (or combination of proteins) in wheat flour. This gluten is unique in wheat and rye flours, in that it is capable of expansion and retention of gases. Through proper fermentation this elastic and coherent condition of the gluten is brought about and shows the need of exact fermentation control. If we add then, a high diastatic malt extract to wheat flour, we are breaking down one of its most important ingredients and should we, by any chance, add too much or allow

our dough to be subjected to the influence of this protease too long, the result is a dark, soggy loaf of bread.

On the other hand, where the amount of diastase is small or non-existent, the proteolytic enzymes are a negligible factor and the dark loaf effect of diastatic malt is eliminated. The modern tendency in the manufacture of malt extract is, therefore, to do away with any high content of diastase. This enables us to use more of this highly nutritional material in our loaf of bread and to supplant all of the cane sugar which we formerly put into our dough, which was not nearly as nutritional. We can, therefore, by the addition of a comparatively high quantity of malt, properly made, multiply the good effects which were formerly claimed for malt extract, by giving it more nutrition, better taste, by helping it to keep our bread fresher for a longer period of time and by still further aiding fermentation.

It has been found that by merely cutting down the diastase, it is not possible to use malt extract in comparatively large quantities in a dough. The reason for this is, first, the darkening effect of the crumb and, second, in the stickiness of the dough. It was necessary, therefore, to find a means of tightening the gluten during fermentation and to eliminate the dark crumb effect.

Need for More Research

Though we have made some strides forward in the manufacture of malt extract, we still see a great amount of work to be done. We are going to further improve this product and are continually working toward that end. We hope, within the next few years to be able to give the baker a still better product, which in its small way, as one of the varied ingredients in bread, will help him to still further improve the quality of his bread.

A Government Wheat Report

FROM many government departments reports are coming these days which tell much less than the whole story of the relationship of the baking industry to the life of the people whom it serves.

The Department of Labor has just flooded the newspapers with charts showing that flour is going down steadily but that bread prices do not follow down, as presumably the department chiefs think bread prices should. All this without consulting a single baker or finding out what conditions modern baking faces in the great cities.

The baker looks on such a chart in vain for any notice of the upward turn the line for rent would take, or the upward turn the line for taxes takes, or the enormous overhead added in the modern bakery by post-war wages, and for the cost of ingredients that make the post-war loaf acceptable in hundreds of thousands of homes that would never accept the pre-war loaf of flour, salt, yeast and water.

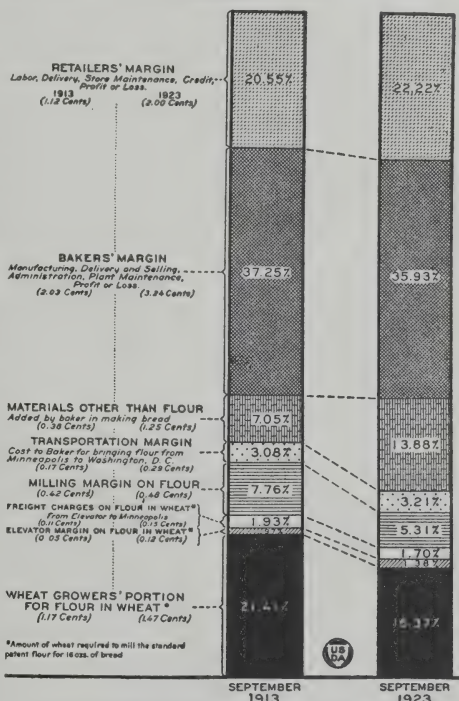
But at last comes a chart that does show some comprehension of modern baking. It is prepared by Secretary Wallace of the Department of Agriculture and shows in its own graphic way what bakers have been doing to produce the modern quality loaf.

Investigators for the department found that in 1913 materials "other than flour" cost the baker only 7.5 per cent, while in 1923 these ingredients had come to cost the baker 13.88 per cent. The wheat grower's portion had gone down, to be sure, but the baker's costs had gone up.

Bakers have long contended that the public fooled itself by talking of baking

in the terms of "a loaf of bread" with nothing more to specify it than that general name. This chart shows that the baker's margin has actually gone down between 1913 and 1923, while the retailer's margin for sales service has increased slightly. In spite of the fact that the baker's share of the retail price, like the wheat farmer's, is less than it was, his service in the field of wrapping, delivery,

DISTRIBUTION OF THE RETAIL PRICE OF A 1-POUND LOAF OF BREAD
IN WASHINGTON, D. C.



SEPTEMBER
1913

SEPTEMBER
1923

FIGURE 20.—Based on bread formulae for the years 1913 and 1923.

plant sanitation and other factors has enormously increased. Other departments will no doubt change their ways.

Books for the Baking Laboratory

IDEAS FOR REFRESHMENT ROOMS. A Ready Reference to Catering Methods, Covering a Wide Range of Practice. By John Wiley of the *Hotel Monthly Press*. 380 pp. Copiously illustrated with pictures, charts and graphs.

In this book the publisher has collected a series of articles from the *Hotel Monthly*. Collectively they make up an entertaining study of the proper way to cater to the public in sandwich shops, cafeterias, dining cars, industrial plants, schools, clubs and soda fountains.

By all means owners of bakeries should read the book, because the genius of merchandising invades every paragraph and picture. Bakers like Jay Burns and Fenn O. Stone will enjoy it, for it everlastingly praises sanitation, and the clean shop as an appetizer.

Then, too, it tells all about the manner in which many leading cafeterias handle the problem of serving bread. The book is not "preachy." Its first story is a story of the University of Chicago's restaurants at Noyes and Hutchinson halls.

The editor of the *Hotel Monthly* evidently ran down every rumor and report that some especially successful restaurant existed in some corner of the earth. He visited the restaurant, or had someone do it for him, and then published all that could be ascertained about its methods that brought success.

Thus he takes his reader to Bear Mountain Inn, in the Hudson Highlands, and describes in detail its various methods for making the guest feel at home. This Inn was built by the late George W. Perkins at the suggestion of his friend, Col. Theodore Roosevelt. It was an experiment in state socialism, as it was owned by the State of New York, and operated by the Palisades Interstate Park Commission, created by the state to administer a 50,000-acre park in the tops of the Hudson Highlands just south of West Point.

The inquiring editor, however, struck trouble—and struck it hard—in reluctant and secretive Boston. He received a postal that a certain globe trotter considered Thompson's Spa in Boston the best eating house in the world. A visit there confirmed that impression, but when inquiries were made as to the Spa methods, the inquirer "only got the air." Speaking as one

looking from the outside in, he suggested that remarkably good food, cleanly served, was the answer to the restaurant's success, just as it was in every other case he examined.

Layouts of the bakery equipment in many of these restaurants are given, together with explanations of bakery accounting methods. Thus we learn that the cafeteria in Ida Noyes Hall, University of Chicago, features lettuce, pimento, nut, chicken and orange sandwiches, and does not mention toast on any menu. Also that the bake-shop turns out 136 loaves of white bread, 76 of whole wheat, 219 pies, 122 plain rolls, 67 sweet rolls and 77 plain cakes, frosted, per day, to supply its restaurant demand.

If bakers are interested in the progress made in their own industry to get more bakers' bread into the home, they should study this book to see how another industry is organizing, with intensive drives, to get the home-diner out of her kitchen altogether and into a cafeteria or a sandwich shop. This means that restaurant catering is a growing and very important factor in the bakery business, and that means to see that restaurants serve the very best bread and toast it is possible to make are not being taken before their proper time.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Some Observations on the Seasonal and Sectional Changes in Kansas Wheat. R. V. McVey. *J. Am. Assoc. Cereal Chem.* 8, 82-6 (1923).—The author gives examples of these changes and offers an explanation for them. He also considers what efforts might be put forth which would help to keep the strength of our wheat crop at a maximum and tend to eliminate the yellow berry tendencies.

J. A. KENNEDY.

Self-Rising Flour. L. Moher, *J. Am. Assoc. Cereal Chem.* 8, 69-72 (1923).—"Only a little review of the methods of analyses as used in the self-rising flour industry." No bibliography is given.

J. A. KENNEDY.

Contributions to Our Knowledge of Leaven Fermentation. Erich Becard. *Centr. Bakt. Parasitenk.*, II Abt. 54, 465-71 (1921).—On a

medium composed of bran extract sterilized by filtration, 2 strains of acid-forming bacteria were isolated. These organisms were capable of producing volatile and non-volatile acids and alcohol. In baking tests in which they were employed a bread was produced corresponding in every respect to leavened bread. Conclusion: Yeast are not essential on the leavening of bread, although they are usually present and presumably involved in the process.

JULIAN H. LEWIS.

Relation of the Cereal Chemist to the Baking Industry. E. B. Clark. J. Am. Assoc. Cereal Chemists 8, 94-9 (1923).

E. H.

The Chemical Engineer in Bakery Management. G. L. Montgomery and A. G. Wikoff, Chem. Met. Eng. 29, 12-5 (1923).

E. H.

Manioc Bread. G. A. Guabrado. Sanidad y Beneficiencia 27, 145-6 (1922); Bull. Agr. Intelligence 13, 1281-2.—Manioc ("yuca") grows wild in Cuba, where it resists the most severe drought. Manioc bread, externally, looks very much like that made from wheat, but, on account of lack of gluten, it is not so soft. It is slightly bitter but the taste is pleasant. The following analyses are given from manioc bread and wheat bread, resp.; moisture 26.00, 29.31; protein (N X 6.25) 11.25, 13.45; starch and reducing sugars 49.11, 54.42; fats 8.60, 1.18; cellulose 4.00; 0.63; ash 1.04, 1.00; P_2O_5 in the ash 0.074, —; acidity calcd. as AcOH 0.40, 1.40%; cal. per kg. of dry matter calculated according to the metabolic formula 4666, 4081. The figures given for the wheat bread represent the average of 5 years analyses.

N. G.

The Nutritive Value of the Proteins of Coconut Meal, Soy Beans, Rice Bran and Corn. H. H. Mitchell and Valente Villegas. J. Dairy Sci. 6, 222-36 (1923).—An extension of the work of Nevins (C. A. 16,1284). Data on the metabolism of rats on an N-free ration were obtained. These results were used in determining the actual digestible N of the protein rations fed. Experimental data are given for the utilization of coconut, corn and soy-bean meal and mixtures, the rations containing 5 and 10% protein. On a 5% protein ration the average utilization of coconut meal protein was 77%, corn 72% and soy bean 78%. On a 10% protein ration the results seemed to show that the coconut-meal proteins are slightly less efficient than those of soy beans, while between soy

bean and rice bran there was no clear difference. Very little supplementary effect was noticed when mixtures of the proteins were fed. The net protein content of a number of feeds is computed.

O. L. EVENSON.

Indices of Nutrition. The Application of Certain Standards of Nutrition of 506 Native White Children Without Physical Defects and With "Good" or "Excellent" Nutrition as Judged by Clinical Evidence. T. Clark, E. Sudenstrieker and S. D. Collins. U. S. Pub. Health Repts. 38, 1239-70 (1923).—A comparison of the Wood (height-wt.-age tables), Dreyer (stem length-chest circumference) and Pirquet (Pelidisi) standards as indices of nutrition. Of 506 children in good health, 20, 13 and 17% respectively as measured by above standards were undernourished.

H. B. LEWIS.

March of Hydrogen-ion Concentration in Bread Doughs. C. H. Bailey and R. C. Sherwood. Ind. Eng. Chem. 15, No. 6, 624-7 (1923).—It is evident from the data accumulated that the H-ion concentration increases at a fairly uniform rate in bread doughs fermented under fixed conditions. In terms of pH this increase appears graphically as an approximate straight line, within the time limits studied. In a 4-hour period the change in pH of laboratory straight doughs averages about 0.41 unit, and in commercial straight doughs about 0.47 unit. Increasing the temperature of the dough as in the "proof" when the dough is finally molded into loaves and raised in the pan, accelerates the rate of increase in H-ion concentration. In straight dough batches weighing about 1000 lbs., the rate of change in pH is apparently somewhat more rapid than in the 1-lb. laboratory batches. H_3PO_4 or acid phosphates added to doughs increase the H-ion concentration, which remains at a higher level throughout the fermentation period. Sponge doughs, made with more than the proportion of water usual for straight doughs, increase in H-ion concentration at a somewhat more rapid rate than do the straight doughs. The change in pH is more rapid in high-grade or patent-flour doughs than in low-grade or clear-flour doughs. The exact chemical character of the acid material which accumulates in dough during fermentation has not been established. Probably organic acids are chief in this group of materials and these result from acid-producing bacteria usually present in the dough ingredients.

Blaming Flour for a Failure

A BAKER who had always bought his flour from a certain miller, suddenly wired into the mill hot, hostile complaints. He claimed the flour was "no good," and wouldn't bake a large-volume loaf of a certain texture he had made famous in his home locality through previous use of this same miller's flour.

Now it happened that this complaint reached the mill in the month of November, 1923. Mills and bakers were working together as never before. It was not a time for mutual bickering and hot-headedness.

Was there some fair umpire? The miller wanted to take the flour back if it was not delivering all that the baker expected of it—provided the expectation was reasonable. The baker wanted his own verdict justified by some baker he could trust.

Both parties settled upon the American Institute of Baking as the place in which to lodge their cause. The mill agreed out of fairness to pay the expenses of an expert from the Institute to the town in which the controversy had occurred. A baker from the service department, who had had much experience in finding trouble in bakers' bread, was assigned the task of locating the cause of the baker's loss in bread value.

The sales manager of the mill accompanied the Institute's baker to the scene of the trouble, for he wanted to see with his own eyes if the mill's flour was at fault. He said it had been tested by reliable chemists.

"But that doesn't count very much," insisted the Service Department baker, "for we have found that after all, the final test of flour strength is the baking test."

The two experimenters arrived at the bakery, and there the baker from the American Institute put 50 pounds of the miller's

flour into the shop mixer. He divided the resulting dough into 65 loaves, and used his best skill in handling the ingredients to get volume. A poor loaf, that was undersized in every case, resulted.

The taste and flavor of the loaf were excellent. The gluten simply lacked the requirements for large-volume loaves. The miller was informed that the flour was excellent flour for any baker who called for a compact, fine textured loaf. In the matter of volume alone it was at fault.

A telegram to the mill started another shipment on its way at once—and this time a longer patent, with stronger gluten was prescribed. Baker and miller, each seeing the light in the same way, and each convinced of the righteousness in intent, of the other party, soon agreed upon terms of settlement for the flour on hand. The baker, knowing exactly where it would work best for him, found he could use it all right in special doughs, while flour from the new shipment would hold up his reputation for large-volume loaves.

The American Institute's Service Department is very young yet. One of the ideals its founders had when it was established was that flour men and bakers alike would come to see it as a means of getting at the truth in disputed cases—by the one sure method—that of making actual laboratory tests. In this case the ideal set up for it worked out in a very satisfactory way.

Belief in Action

I believe in Trade Associations. They can make for stability and economy in industry—their two great fields of usefulness lie in lifting standards in the trades and in the increased efficiency of production and distribution.—Herbert Hoover.

UNIVERSITY OF ILLINOIS-URBANA



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